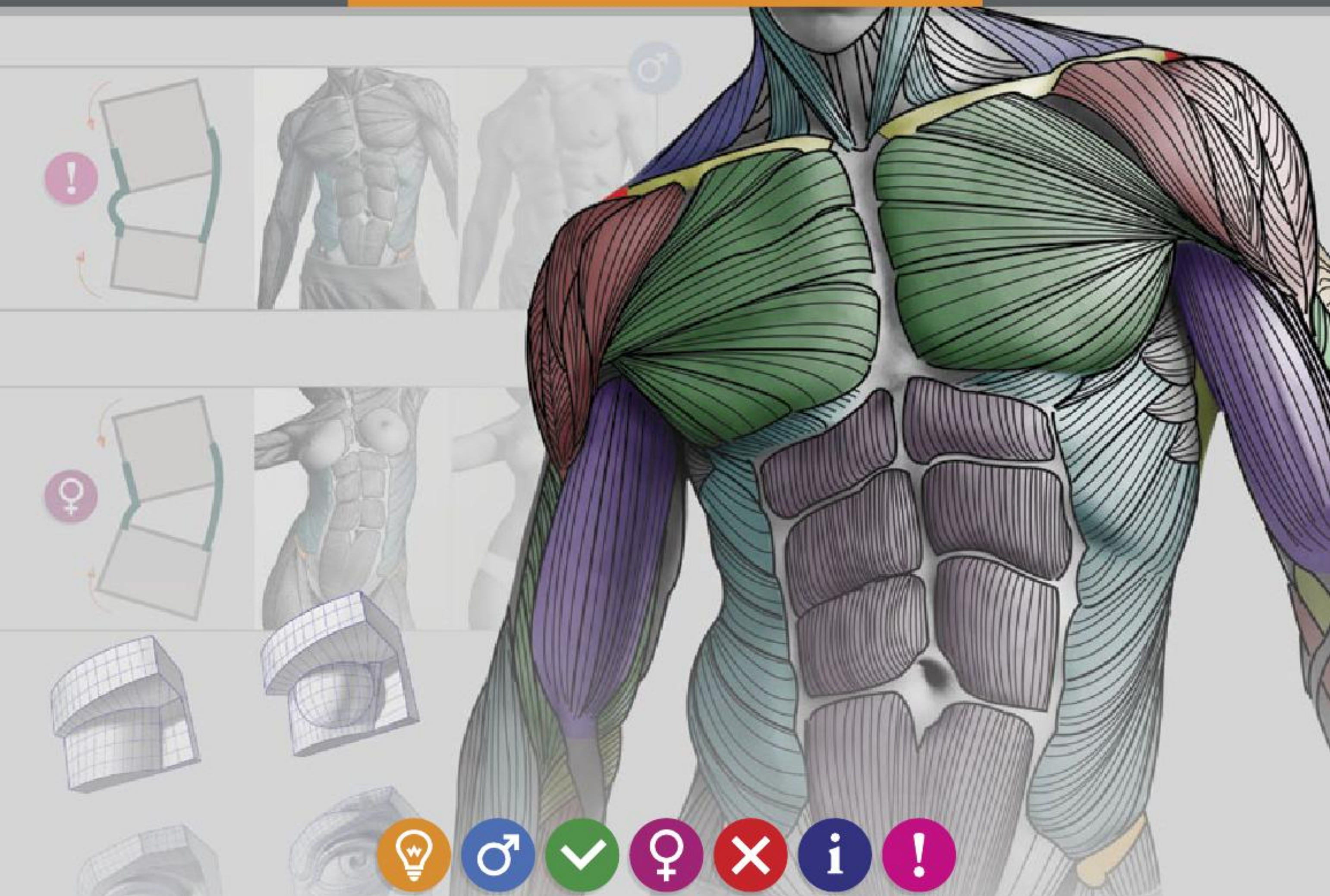


ULDIS ZARINS  
WITH  
SANDIS KONDRATS

# ANATOMY FOR SCULPTORS

UNDERSTANDING THE HUMAN FIGURE





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UNDERSTANDING THE HUMAN FIGURE

2014



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Printed in USA

First Edition, 2014

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# ABOUT, HISTORY, BACKGROUND

## High Hopes

At the beginning of the 1990s, on the ruins of the USSR, in the newly formed Latvian nation, a young person, named Uldis Zarins, full of ideals and hopes, dreamed of becoming a sculptor. In 1994, he was accepted to the Art College of Riga. Studies were difficult and competition was fierce, but they resulted in satisfaction. Every day he replicated famous classical Greek portraits, busts, and figures in clay. The outlook prevailed, that frequent replication of antique sculptures would facilitate the understanding of form creation. After only half a year, Uldis understood that eyes, of course, adapt, and hands become more agile; however, understanding of the form did not materialize.

## The Cheek of the Amazon

One day, when replicating the head of the Amazon portrait of famous sculptor Polykleitos, he ran into a problem: How to construct a cheek? It was clear that the form was not just a sphere, but several complicated forms combined. He thought: "It would be great to understand what these forms are and how they go together!" Teachers only discouraged, saying: "Study, research, measure!" – But what to measure, when there aren't even any corners, nor facets!? A teacher answered: "Study anatomy, maybe you'll get by somehow."

## First Anatomy Studies

A modeling teacher told Uldis: "If you want to understand everything, here is a human skull and anatomy book. Study and create an *écorché* for us!" Uldis decided to create a bust with shoulders. All of its muscles were in place, however, the sculpture looked bad. The main thing was that his understanding of the form had not increased one bit! In the place of the form, he had studied muscles. In digging through a mountain of anatomy books, Uldis realized that they were all meant for painters and drawers. He found that all of these books were equally boring, with scant, chaotic drawings. "No one, it turns out, has thought about sculptors!" Uldis found only one anatomy book, which only slightly touched on the form – Gottfried Bammes' *Der nackte Mensch*. Then he asked himself the question: "Why are there so few pictures in the books and so much text!"

## Academy Studies

After college, Uldis enrolled in the Art Academy of Latvia (Latvijas Maksas Akadēmija). There, same as in college, emphasis was placed on exercises, not on the understanding of how to create the form. Each time Uldis created a new sculpture, he made preparations, not only to arrange the frame and the edge, but also drew a small paper sketch where he could analyze the form in an understandable way.

Over the course of several years, drawings, sketches, anatomy books and successful photographs were accrued. Uldis began to notice, that the sketches he had created, as well as images, were in high demand among colleagues. He often heard the suggestion that he should collect them all and publish a book, which would be a composite of form analysis, as well as fundamental information about anatomy that sculptors would need to know. This was how Uldis came up with the idea for the creation of the book.

## Kickstarter

Years went by and Uldis created the website [anatomy4sculptors.com](http://anatomy4sculptors.com), a proportion calculator, and Facebook page, where he publishes anatomy reference images and his drawings. On the Facebook page, Uldis engaged in conversations and tested the ways of explaining the human anatomy. In the spring of 2013, with the help of friend Sandis Kondrats, a Kickstarter campaign was organized, creating an international team, with whose help Uldis realized his dream of publishing the book, *Anatomy for Sculptors*. During the project development phase, Sandis and Uldis were joined by friends from Latvia, Sabina Grams and Edgars Vegners, who contributed with their expertise in Graphic Design and Photography. With much help from Sandis' brother Janis Kondrats, we were able to create a unique subscription system on the website to engage and test the book's content with the project supporters. As English is a second language for Uldis and Sandis, the assistance of editors and proofreaders, Monika Hanley and Johannah Larsen, was indispensable. Friendships, created through the project with Chris Rawlinson and Sergio Alessandro Servillo, filled in the blanks with 3D scans and sculpt reference materials. The Shutterstock service, which supplied Uldis with a lot of great artwork to build on the book's content, was also a great help. Thanks to the friends of the international sand sculpting community, with whom Uldis and Sandis had conversations about the book during their travels over the course of the year, which was a great help in the book's development process. The support of the Seattle Latvian community was very special while working on the project. Also, without the support and understanding of the families and friends of Uldis and Sandis, this project would not have been possible.

Finally, the book has come into physical form after hard and passionate work over the course of 20 years, since Uldis came up with the dream of creating such a book. It took him 11 years of classical art studies, over 200 international sculpting festivals, symposiums and exhibitions in 9 years and the past 4 years spent on reading books, researching human anatomy, and creating illustrations for this book to come to life.



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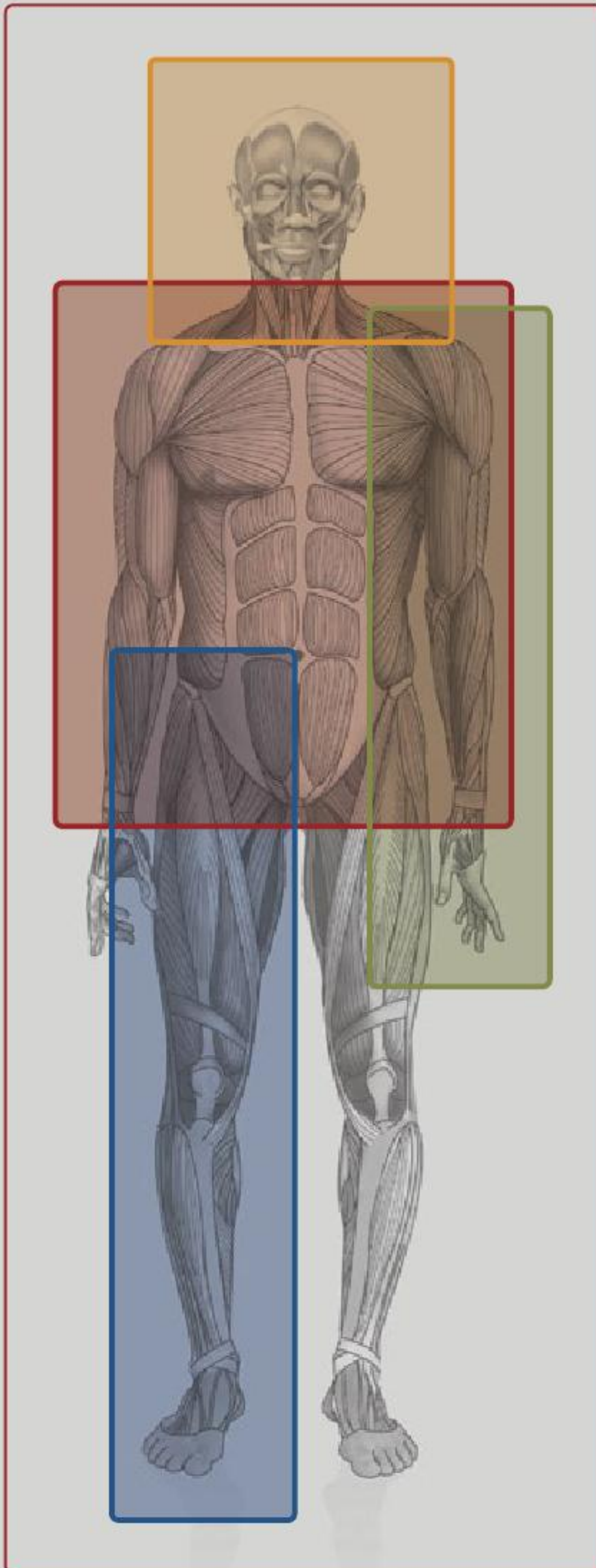


THANKS TO  
**KICKSTARTER**  
AND 384 SUPPORTERS FROM ALL OVER THE WORLD!

## SPECIAL THANK YOU:

Aiman Akhtar  
Alexander Jack Ware  
Amazin' Walter  
Amy Medford and Leonid Siveriver  
Andrew Plumb  
Barbara C Brown  
Bassanimation  
Bert Adams  
Brent Baxter  
Carlos NCT  
Damon Langlois  
Digital Double  
Dominic Qwek  
Douglas Heitz  
Dr. Patricia Beckmann Wells and Petey  
Electric Geisha LLC  
Elisabeth  
Frost Holliman  
Gerhard Schellert  
Hasan Bajramovic  
J. Quincy  
Jason Hill  
Jeanne Young  
Jeff Strong  
Jerome Ranft  
Jessica Dru  
Jino van Bruinessen  
Josh Ruiz  
Karen Jean Fralich  
Kasper Appel  
Kirk Rademaker  
Kristopher Vita  
Kurt Papstein  
Lee Hutt FNSS  
Martijn Rijerse and Hanneke Supply  
Martin de Zoete  
Miguel Guerrero  
Nick Sho Ito and zbrushhangout community  
Peet Lee  
Peter Redmond  
Pucheu-planté cédrick  
Rachel M. Brown  
Raffaele Pisoni  
Rob Macko  
Roger Geraedts  
Rusty Croft  
Saitou Takeshi  
Sandi "Castle" Stirling  
Scott  
Solomon Temowo  
Steven R. Berkshire  
Thomas Stanton  
Toban Magee  
Warren Marshall  
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Wyeth Johnson





## FIGURE & TORSO

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## HEAD & NECK

93



## UPPER LIMB

143



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185







## HUMAN SKELETON

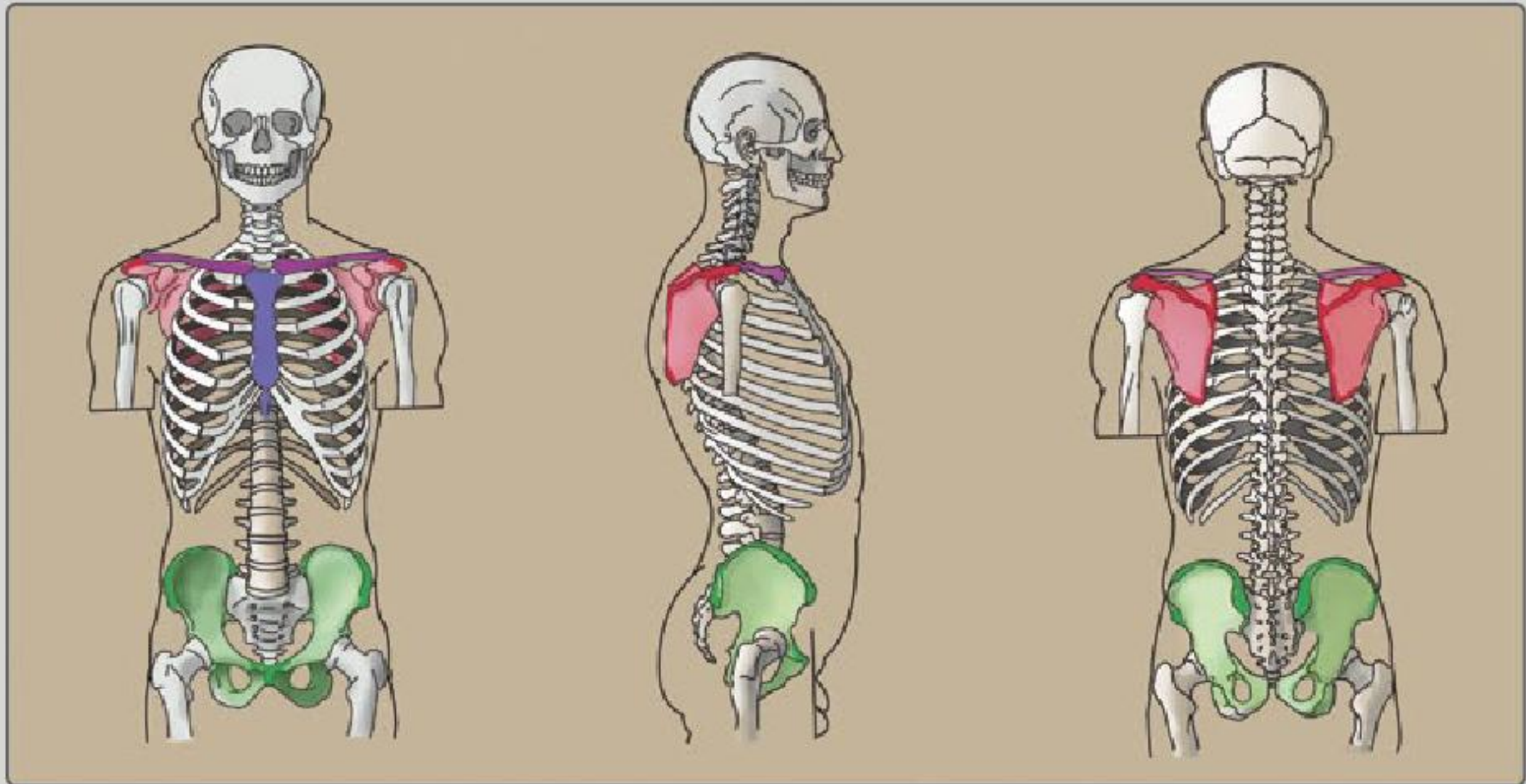




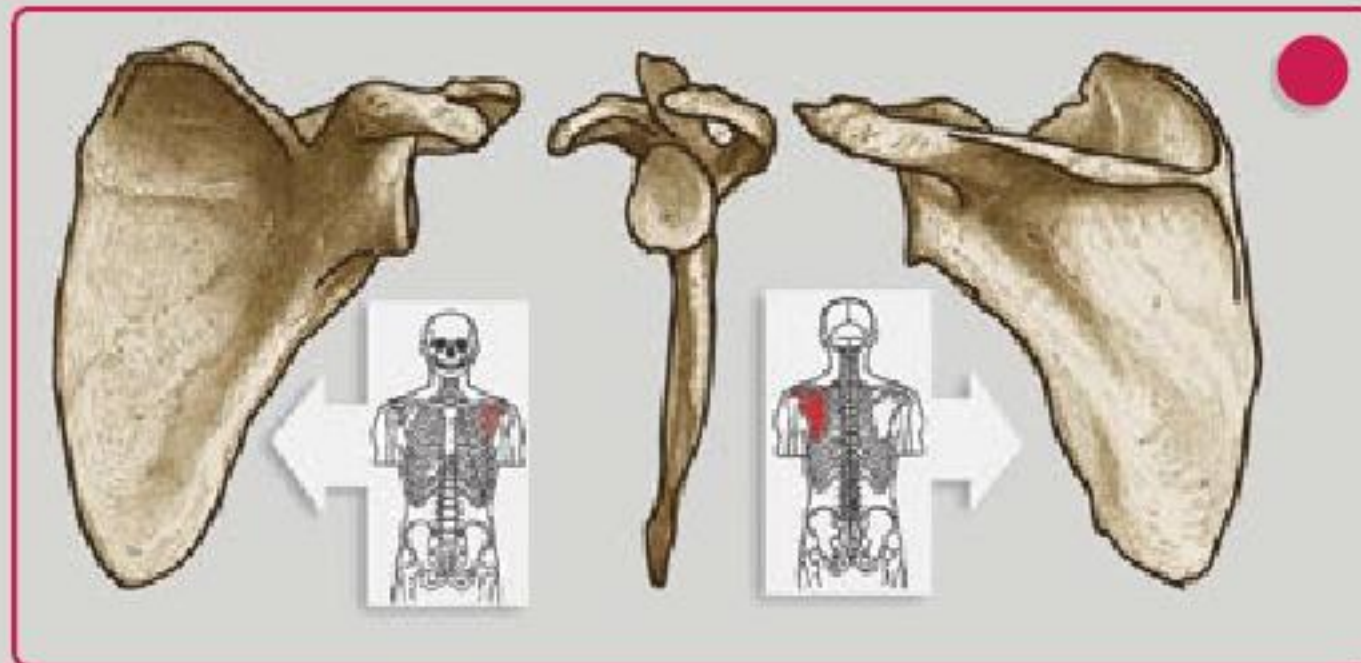
## IMPORTANT LANDMARKS OF TORSO

i

**PROMINENT SUBCUTANEOUS PROTRUSIONS – GENERALLY POINTS OF BONE, THOUGH SOMETIMES FORMED BY ENTIRE BONES, ARE CALLED BONY LANDMARKS OR SIMPLY LANDMARKS. THEY MAY SERVE AS IMPORTANT PROPORTIONAL MEASURING POINTS OF THE BODY. LANDMARKS ARE THE KEY TO UNDERSTANDING THE EXACT POSITION OF THE ENTIRE SKELETON, WHICH FOR THE MOST PART IS EMBEDDED IN THE SOFT TISSUES OF THE BODY.**



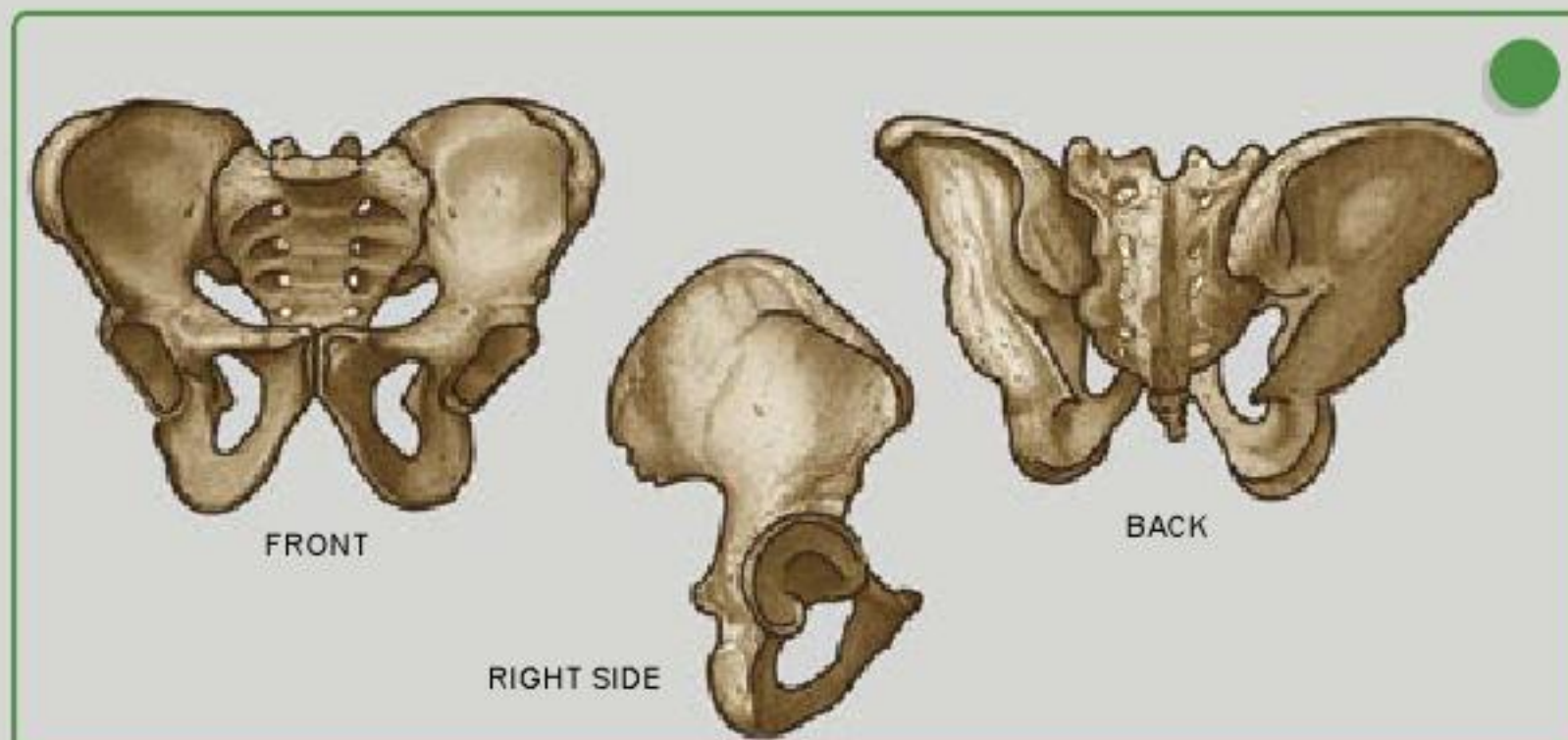
SHOULDER BLADE (SCAPULA)



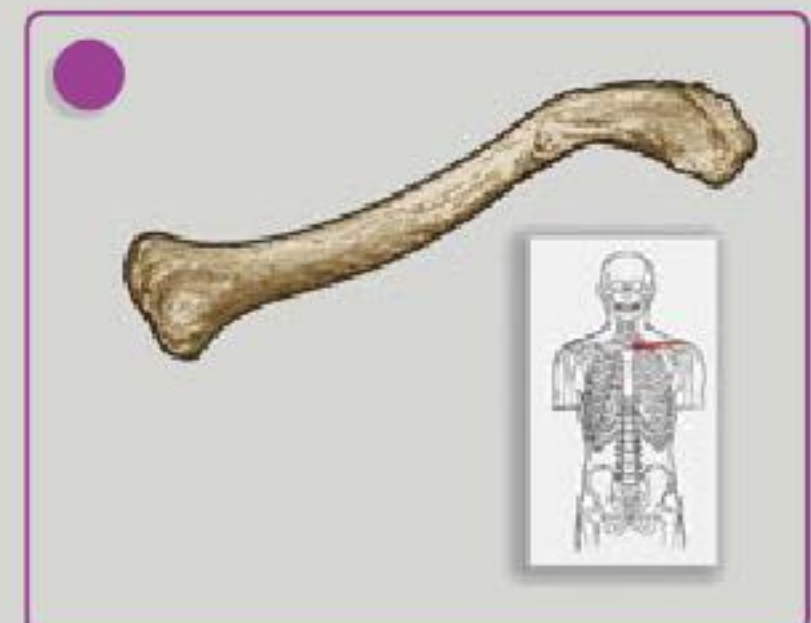
CHEST BONE (STERNUM)



PELVIS

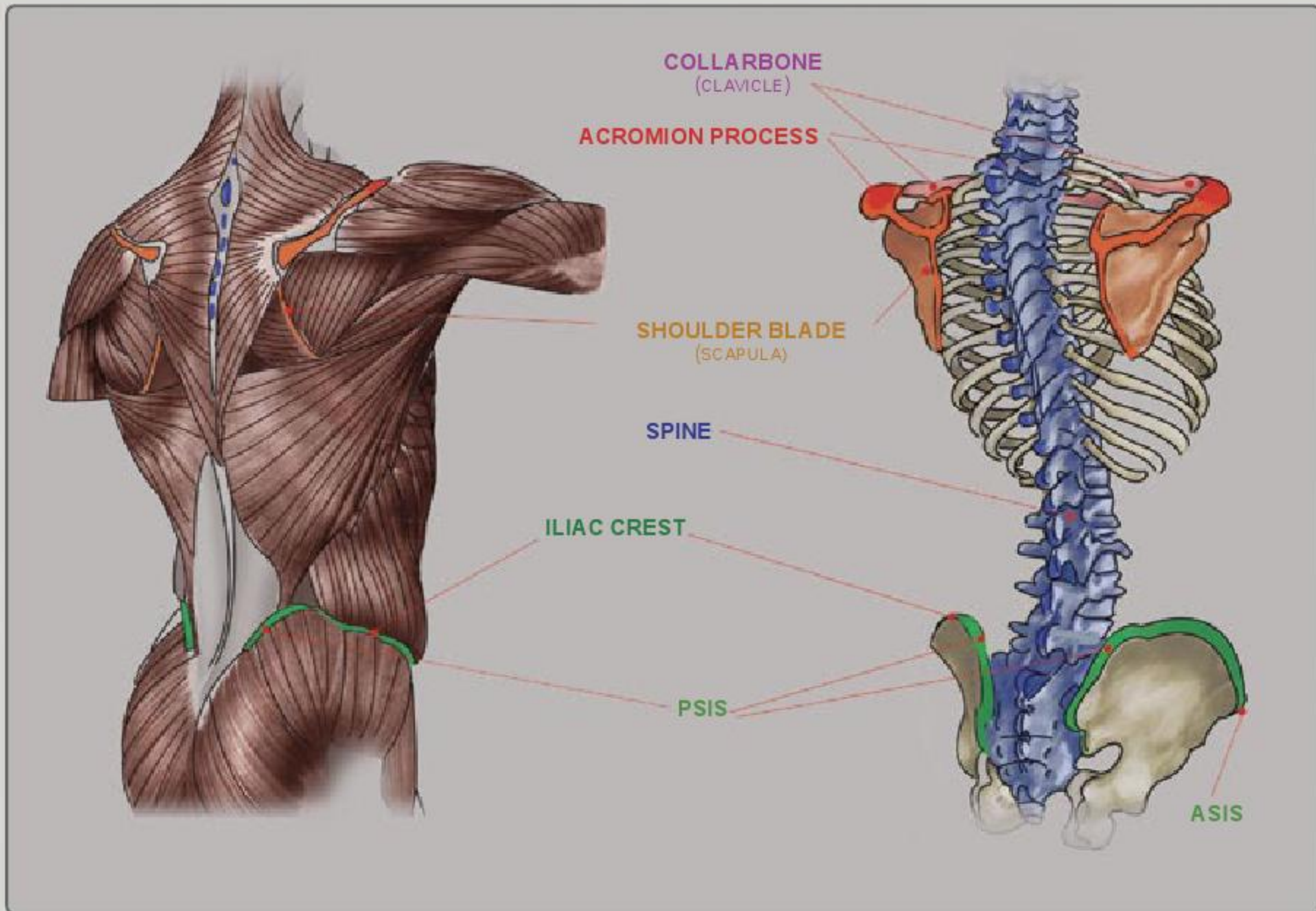


CLAVICLE





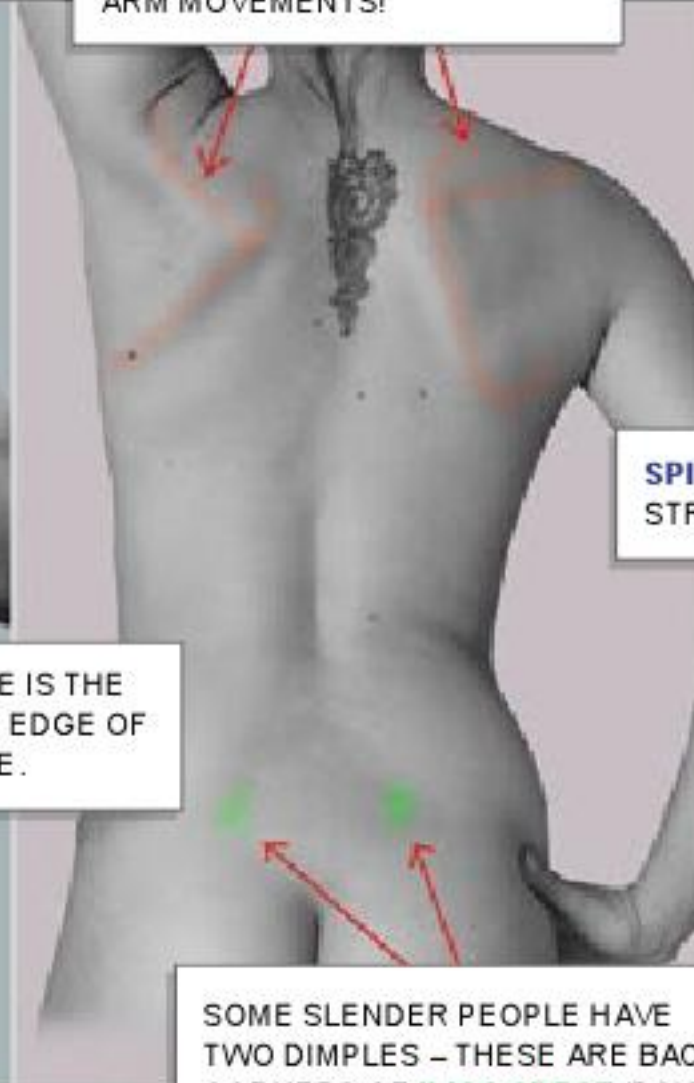
# MAIN LANDMARKS OF BACK OF THE TORSO



THE MALE'S **SHOULDER BLADE** IS COVERED BY A THICK LAYER OF MUSCLES AND IS HARDER TO LOCATE THAN A FEMALE'S.



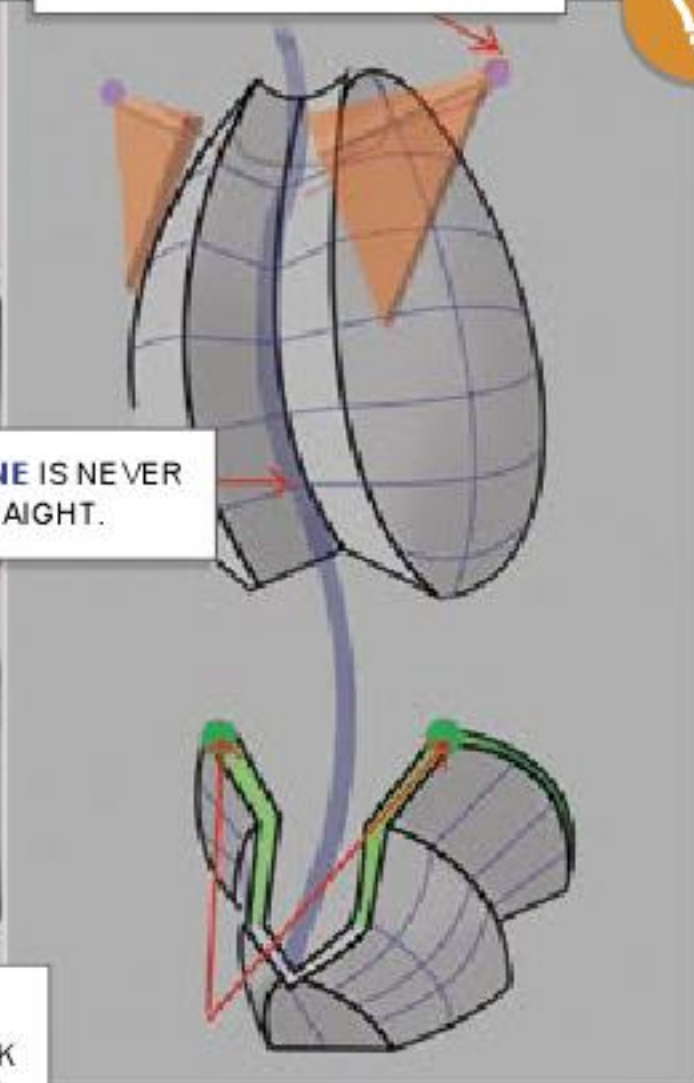
PAY ATTENTION TO POSITION OF **SHOULDER BLADE** DURING ARM MOVEMENTS!



THIS LINE IS THE BOTTOM EDGE OF RIB CAGE.

SOME SLENDER PEOPLE HAVE TWO DIMPLES – THESE ARE BACK CORNERS OF **ILIAC CREST** (PSIS).

AC JOINT IS WHERE **CLAVICLE** MEETS **ACROMION**.

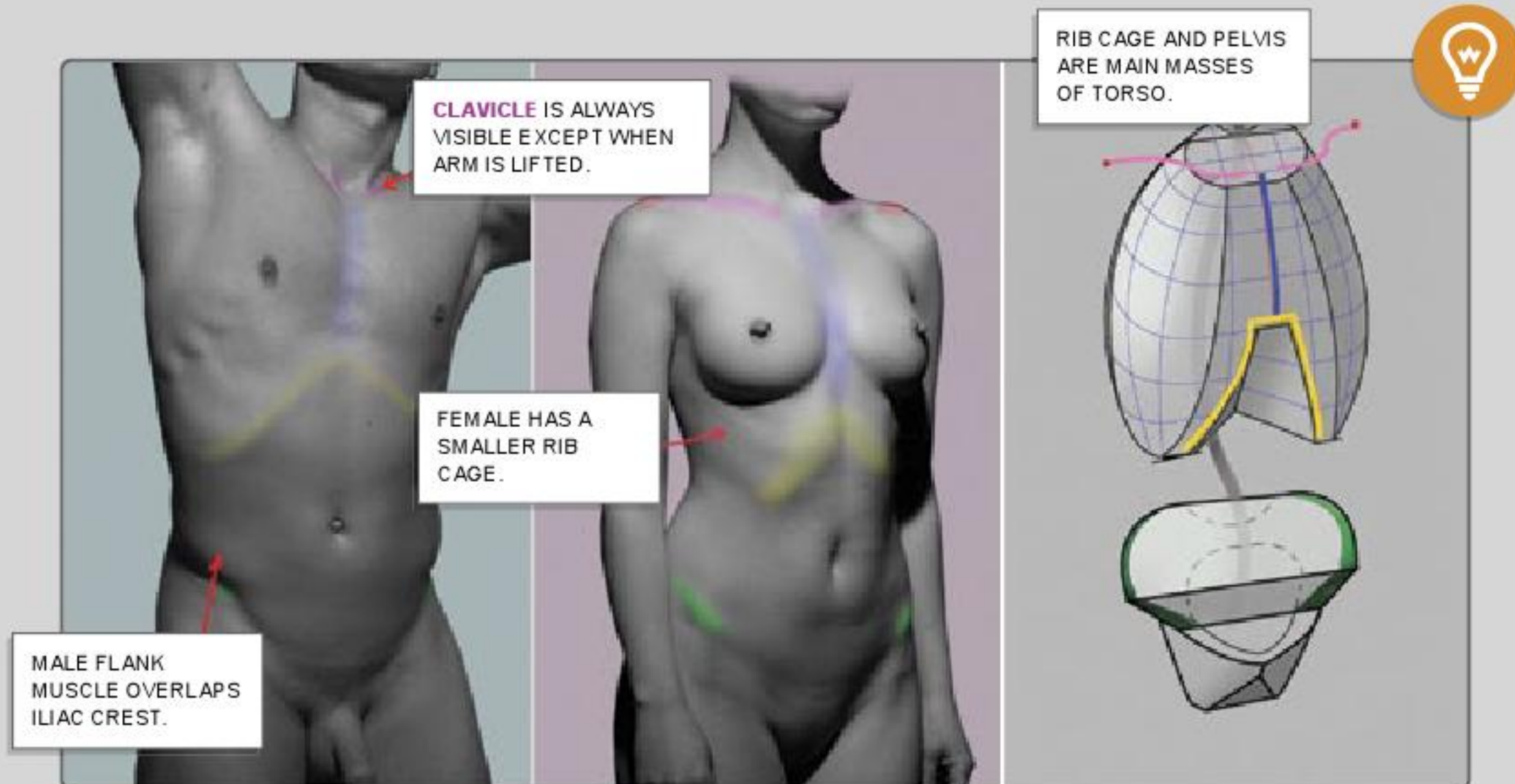
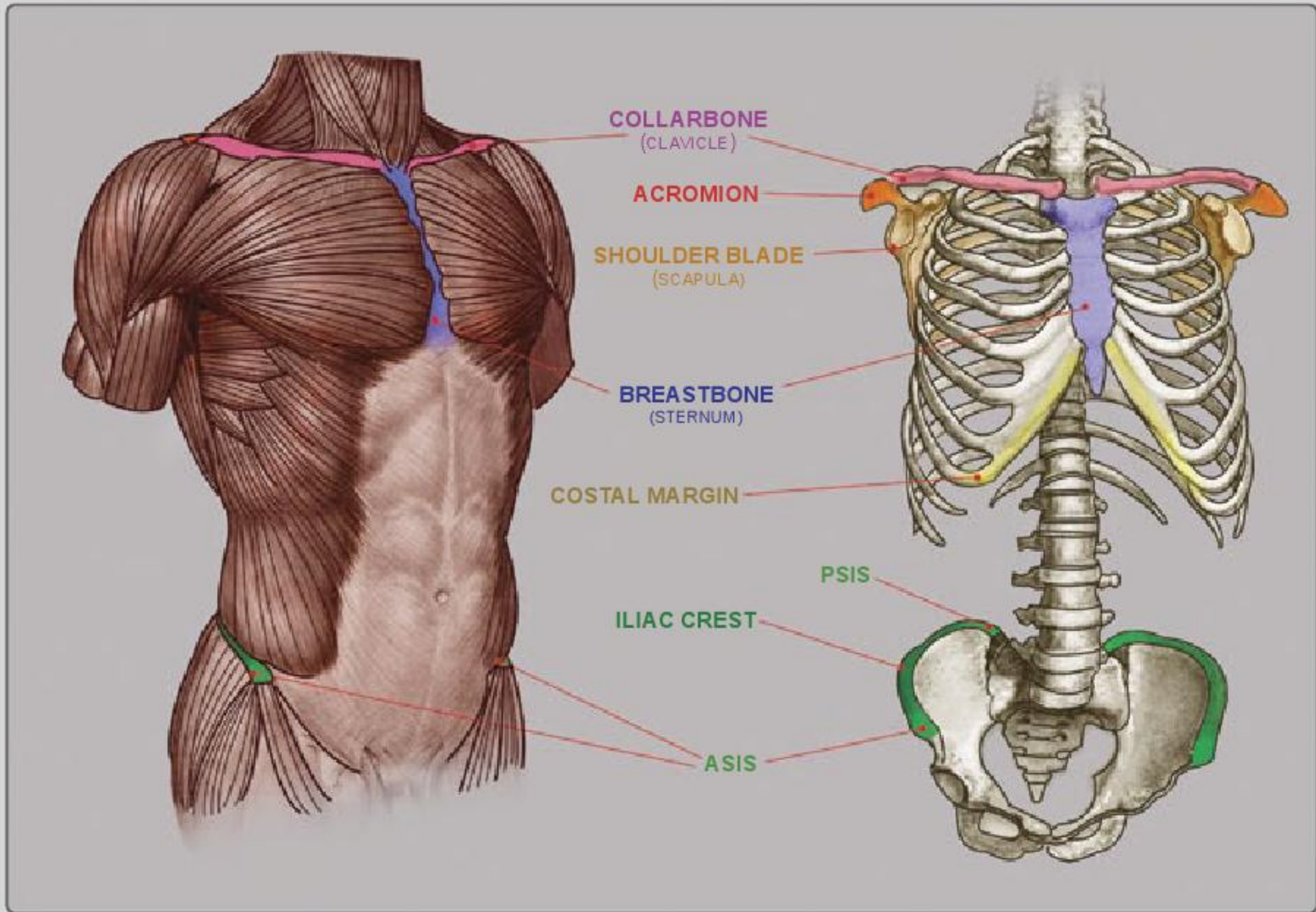


**SPINE** IS NEVER STRAIGHT.



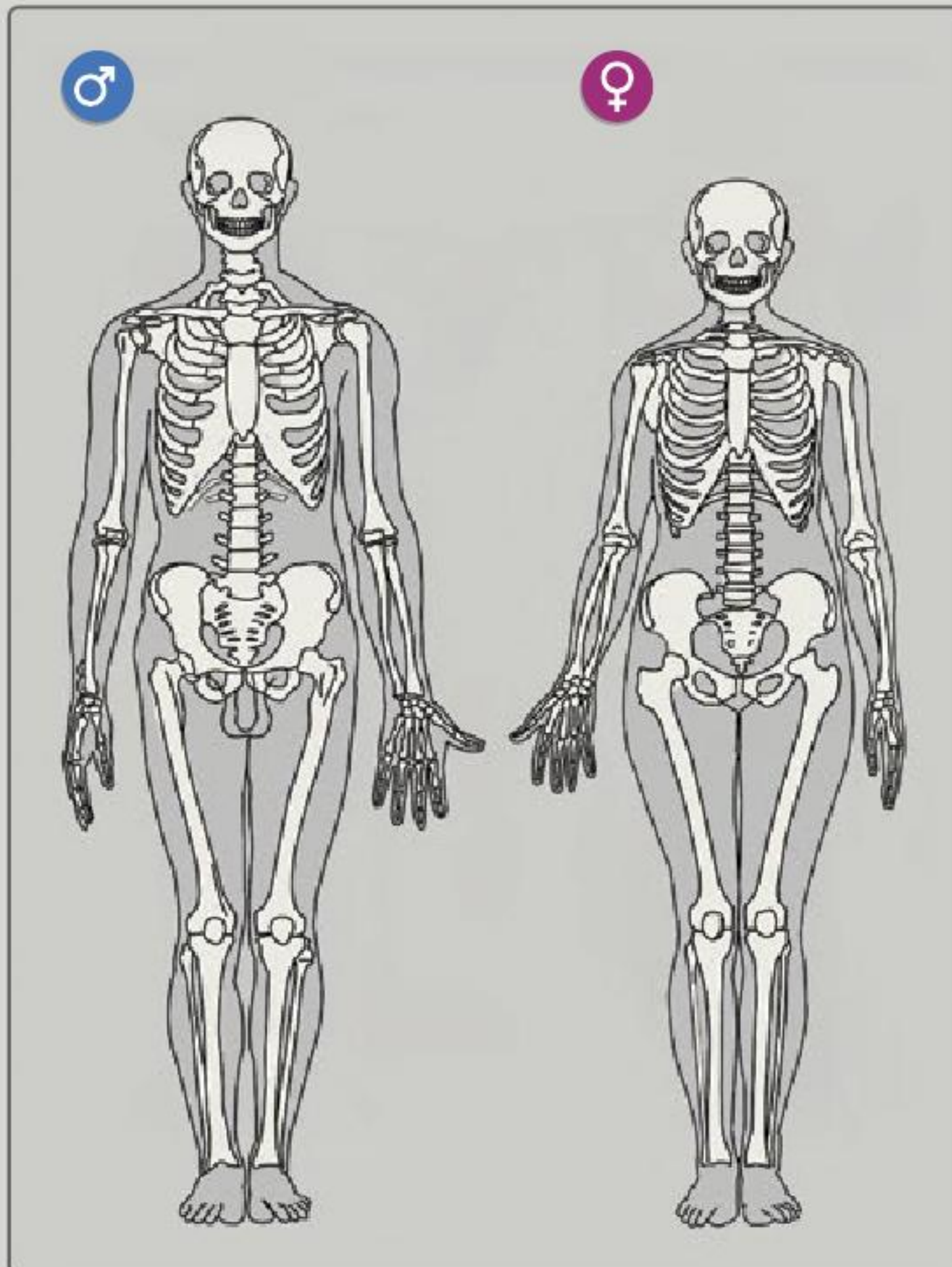


## MAIN LANDMARKS OF FRONTAL TORSO

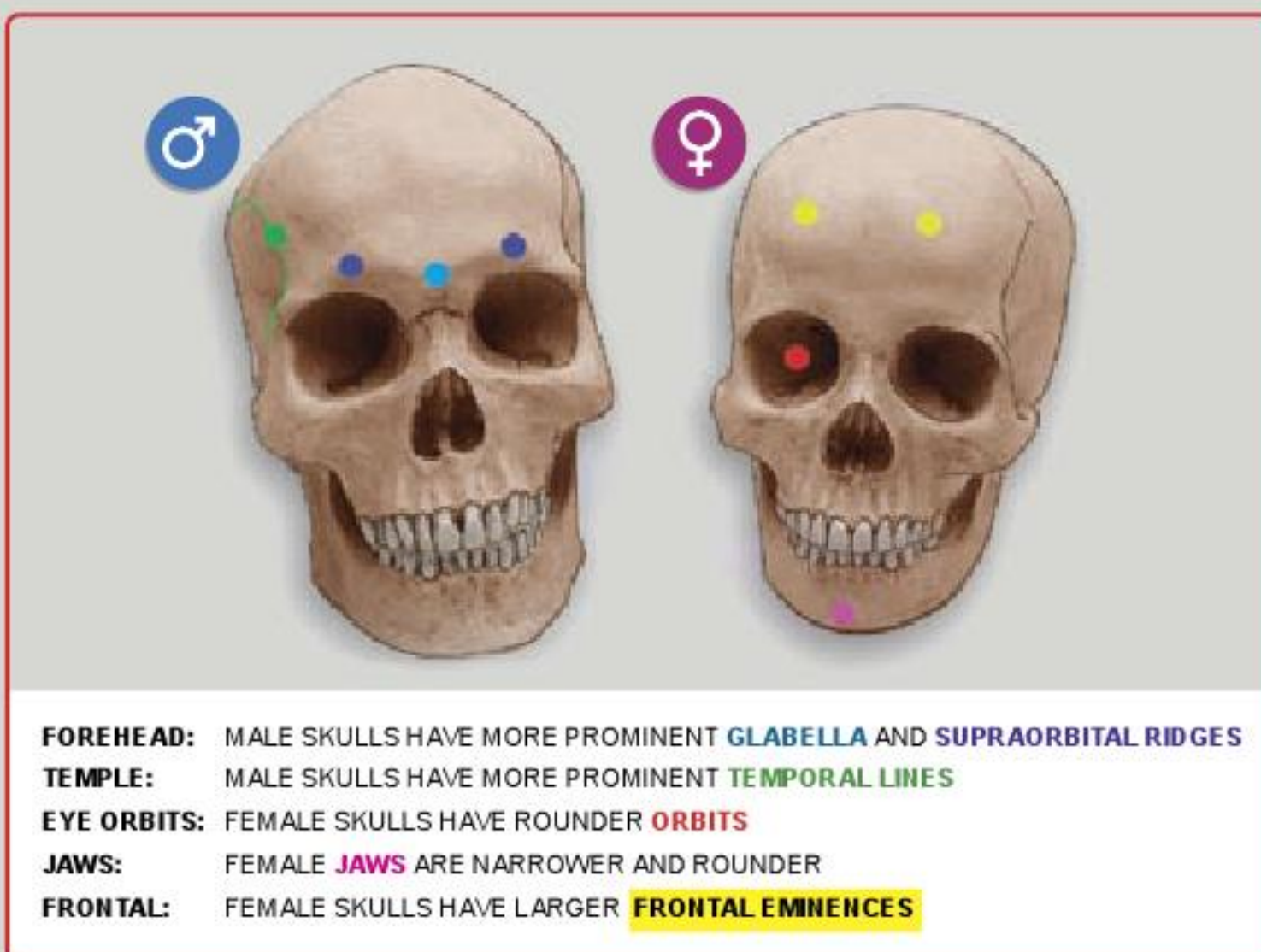




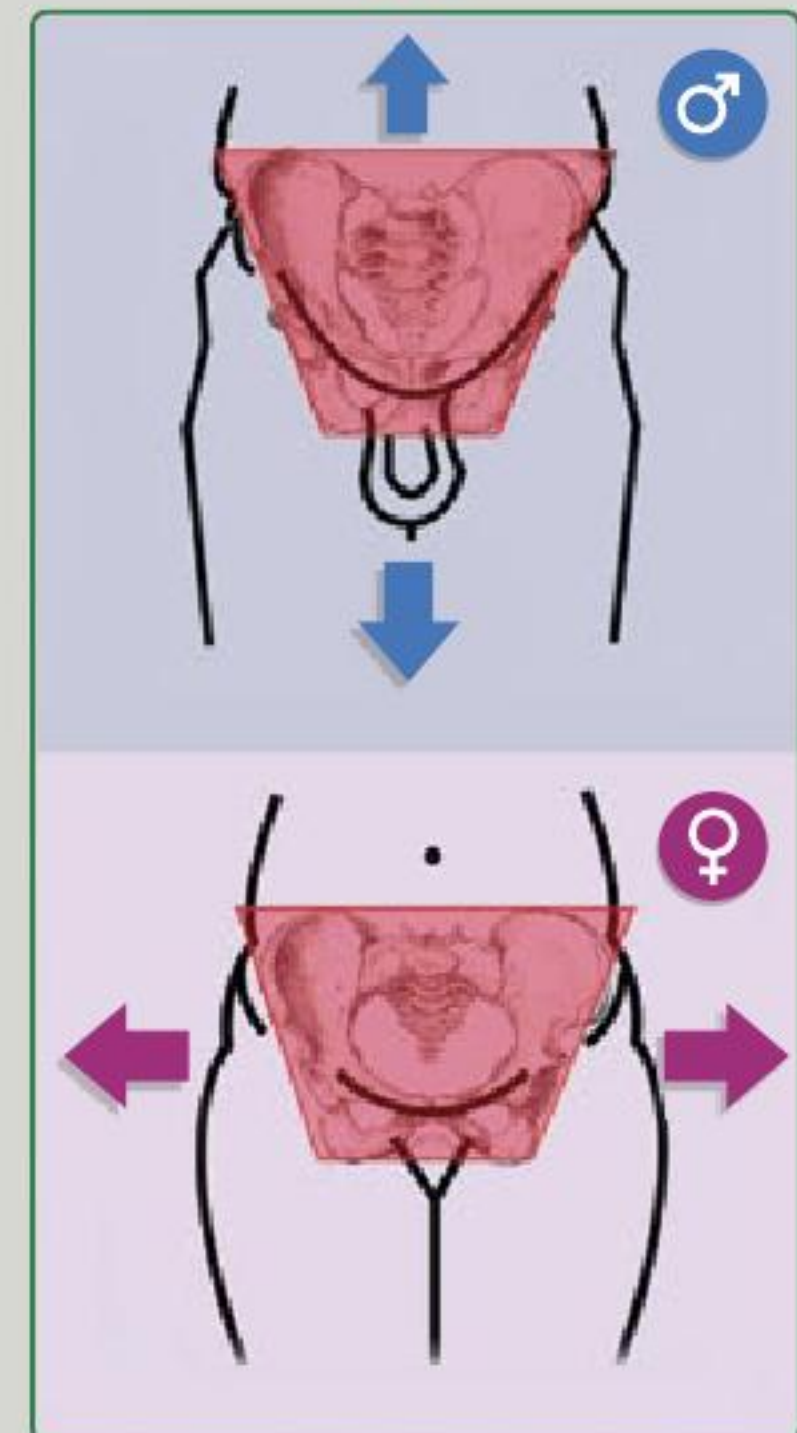
## MAIN DIFFERENCES BETWEEN MALE AND FEMALE SKELETONS



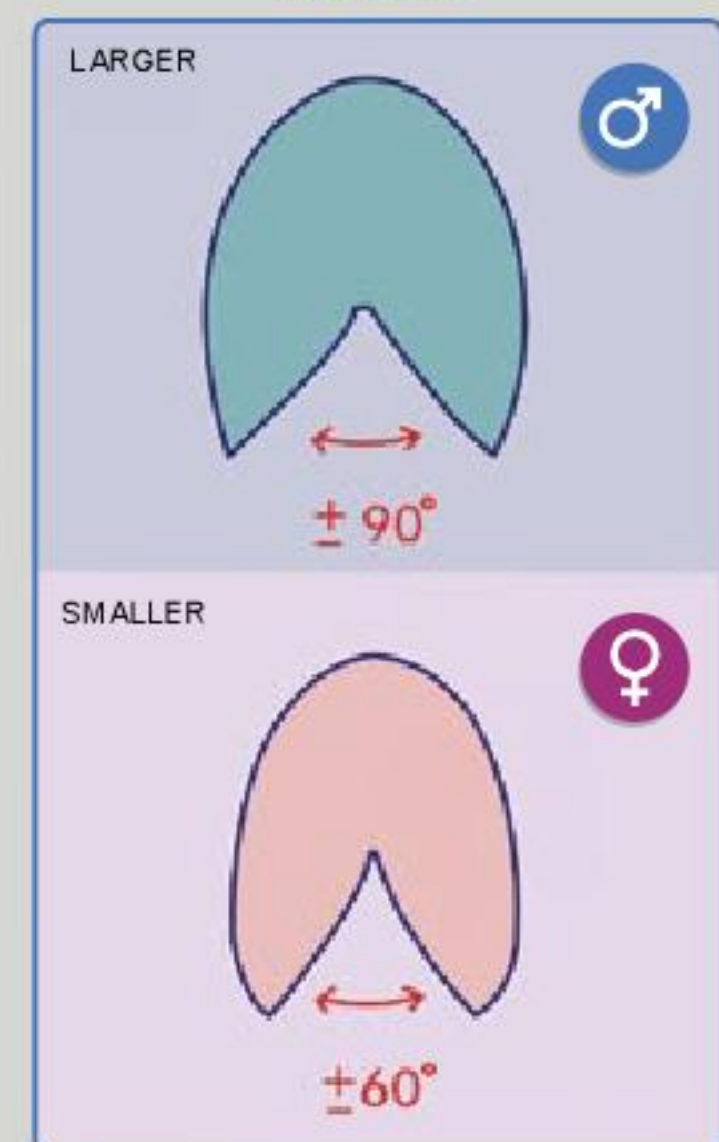
SKULL



PELVIS

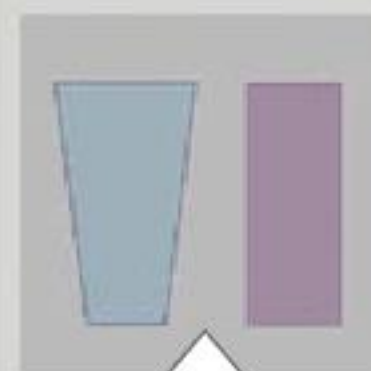
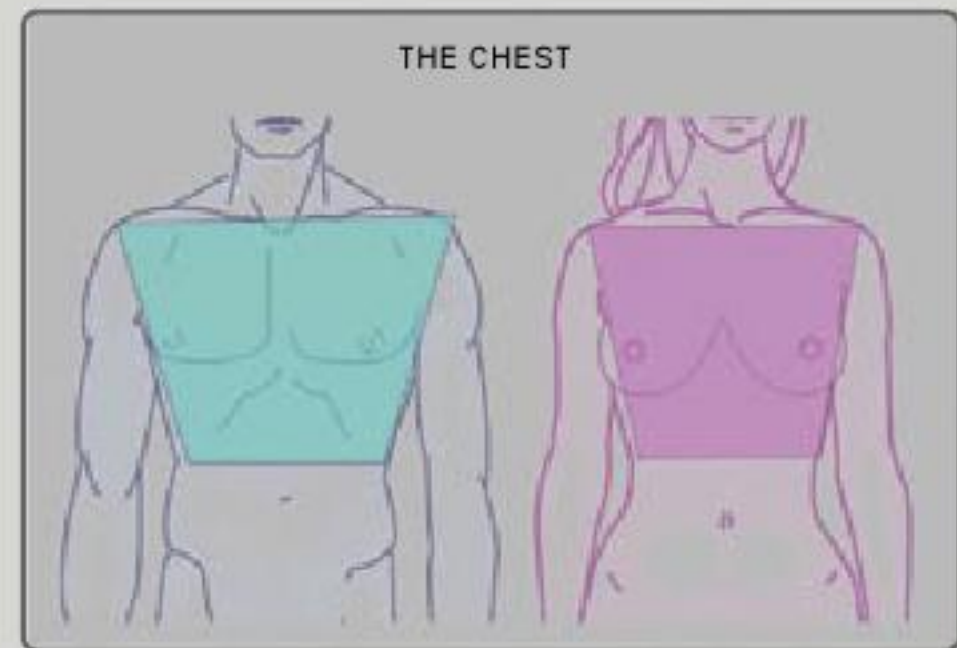
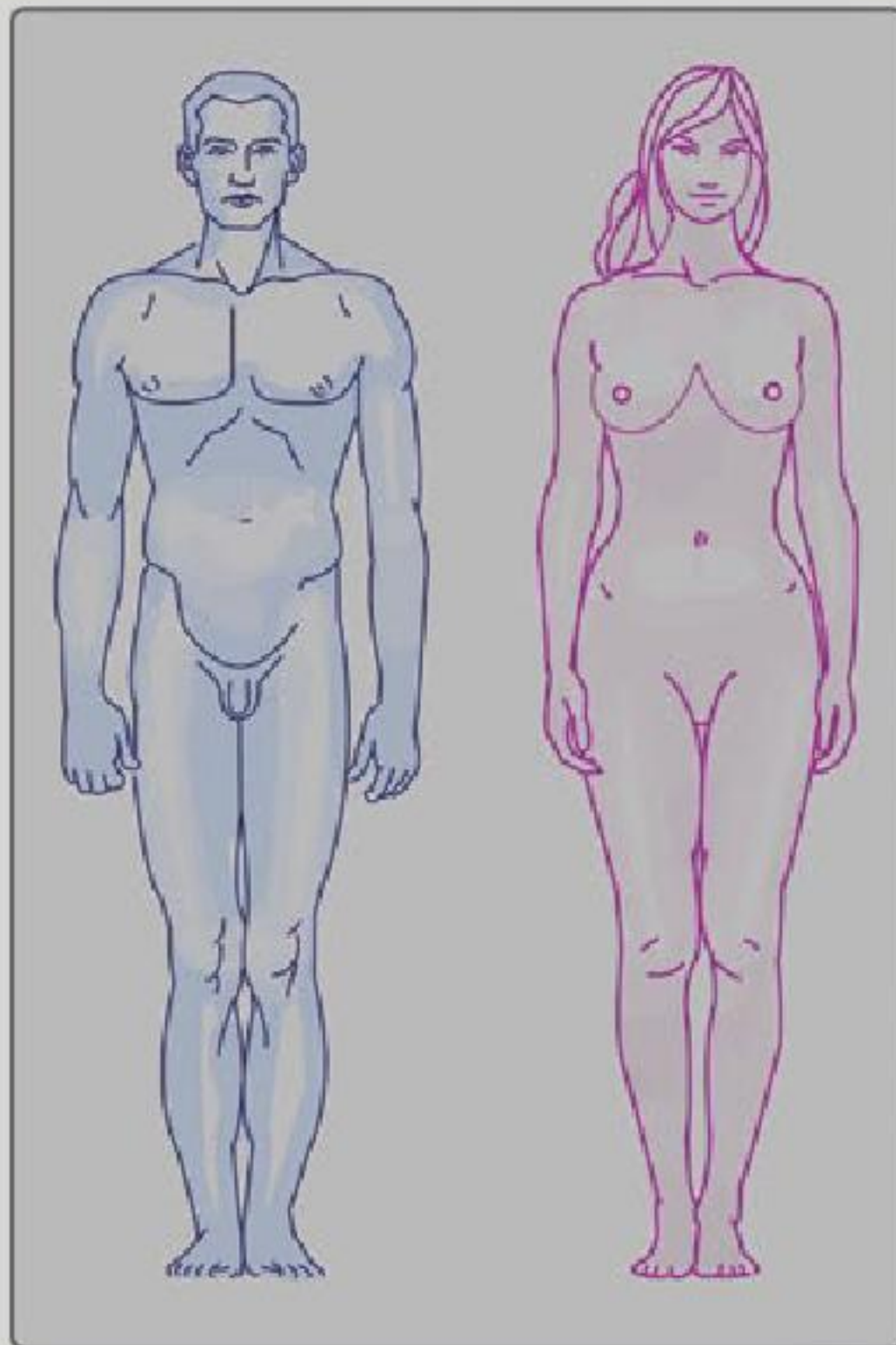


RIB CAGE

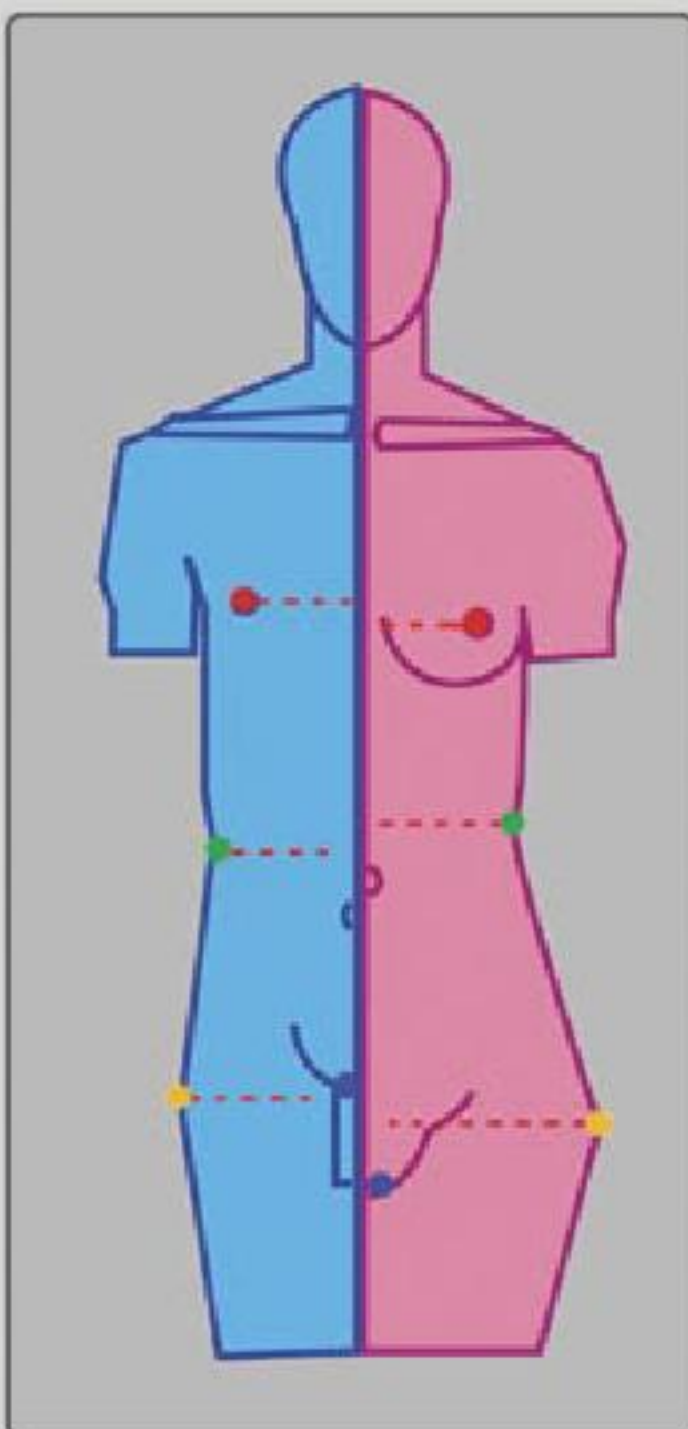
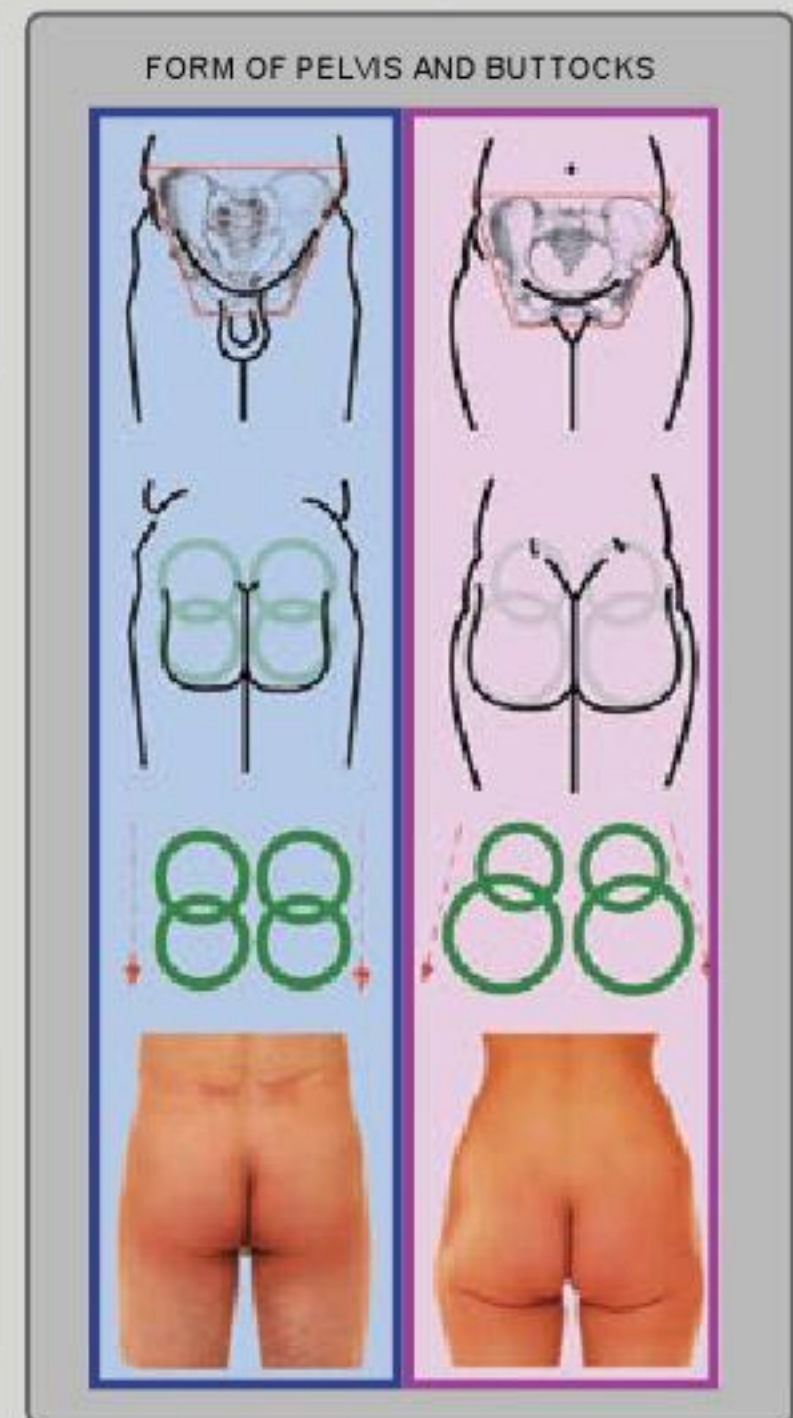




## MOST IMPORTANT DIFFERENCES BETWEEN MALE AND FEMALE BODY SHAPES

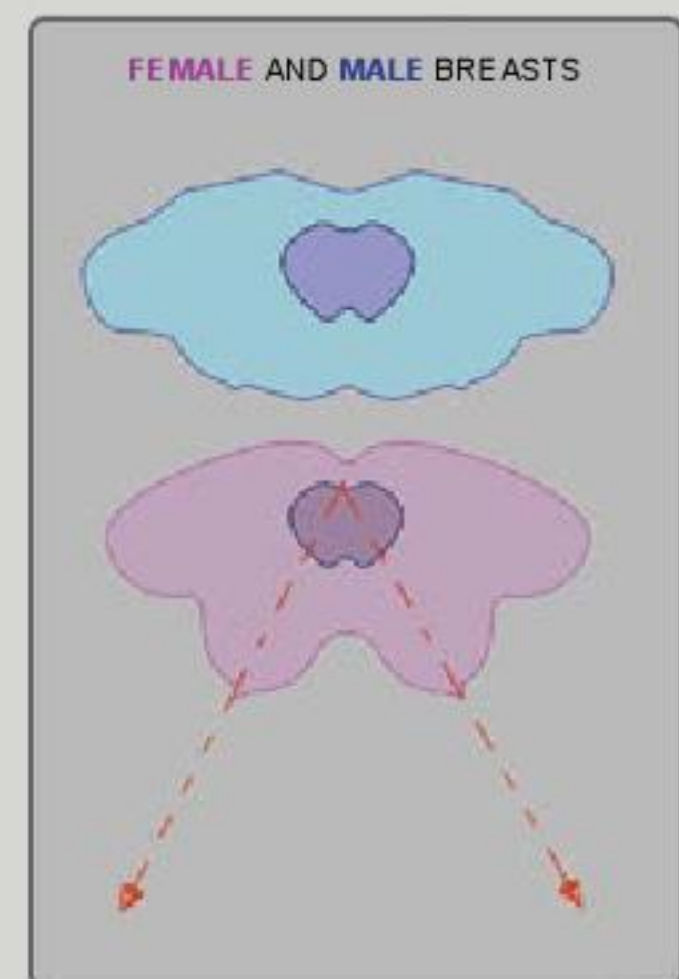
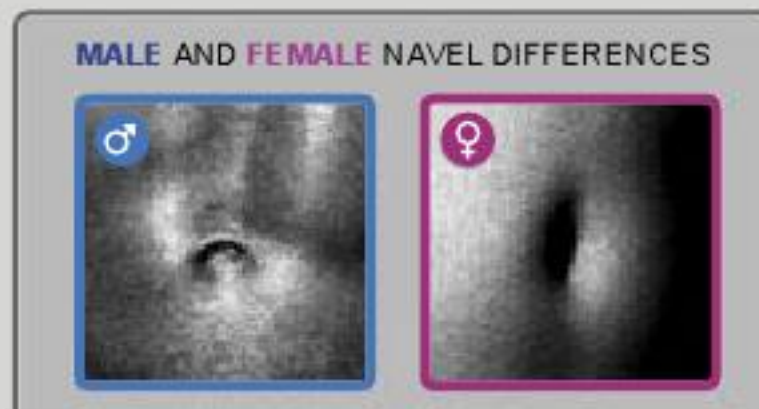


**NOTE:**  
DIFFERENCE IN  
SILHOUETTE  
AT SHOULDERS  
AND HIPS.



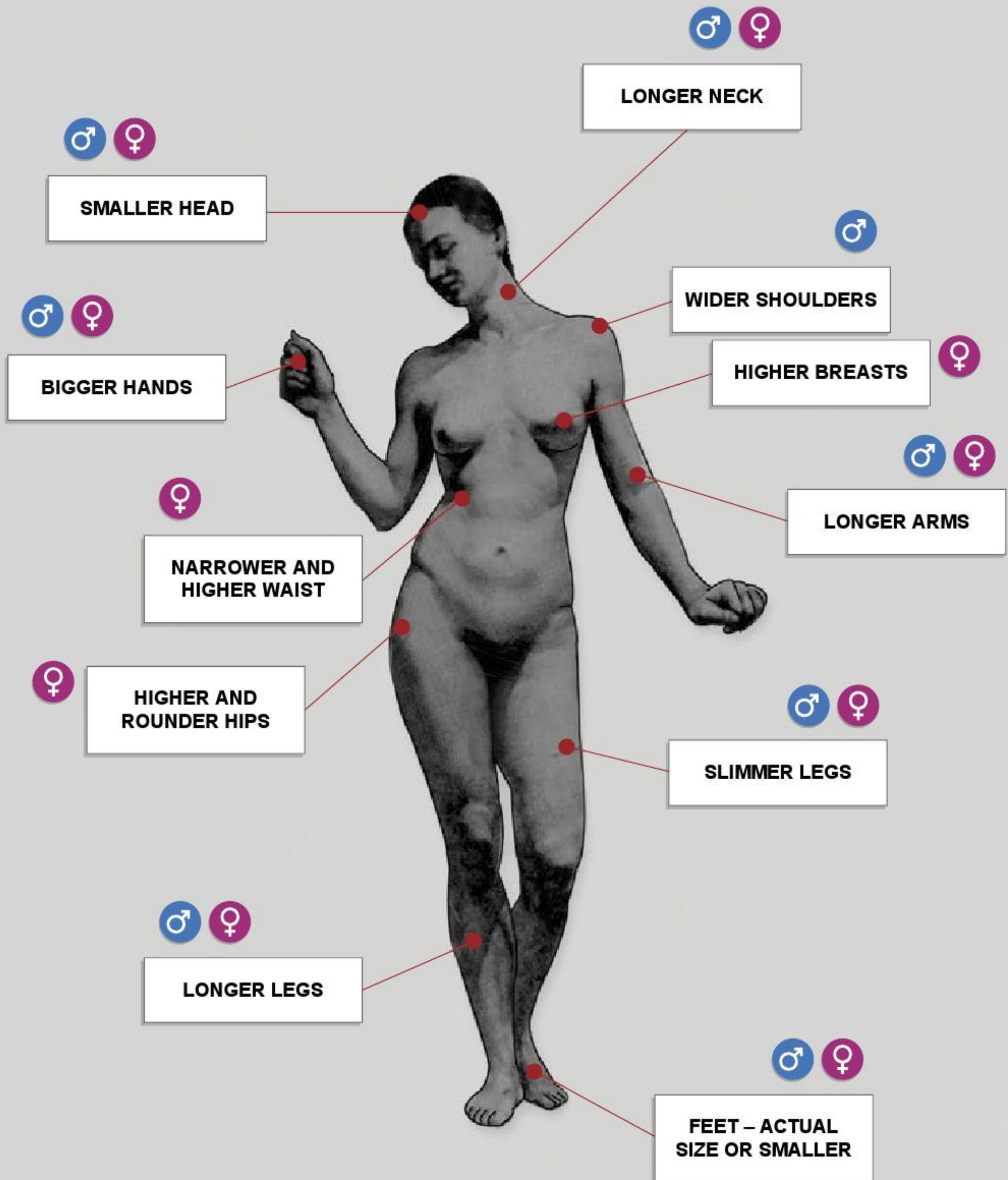
FEMALE FORMS ARE  
SOFTER AND CURVILINEAR.  
MALE FORMS ARE MORE  
ANGULAR.

FEMALE HAS SLIGHTLY  
THICKER SUBCUTANEOUS  
FAT THAN MALE.



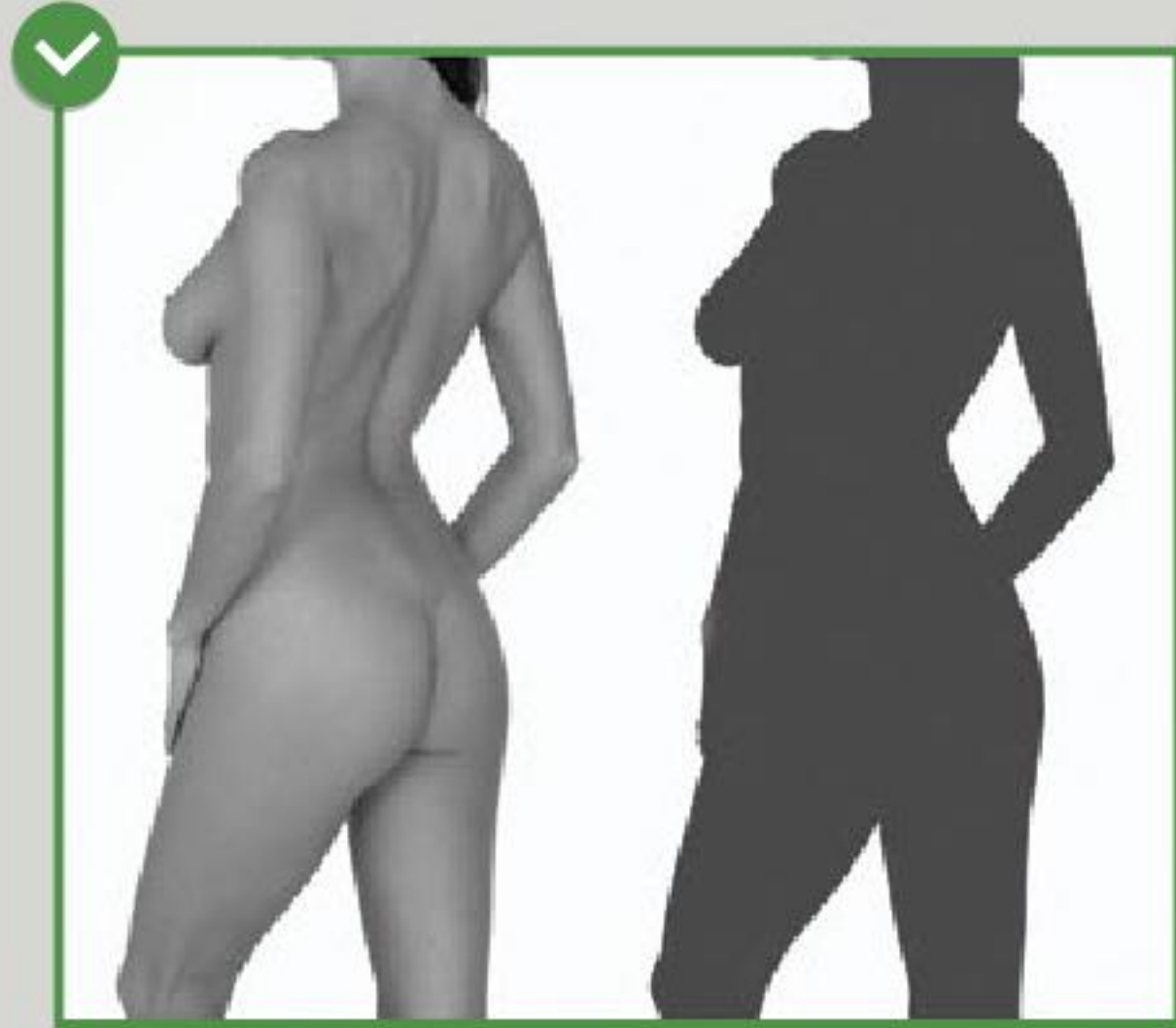
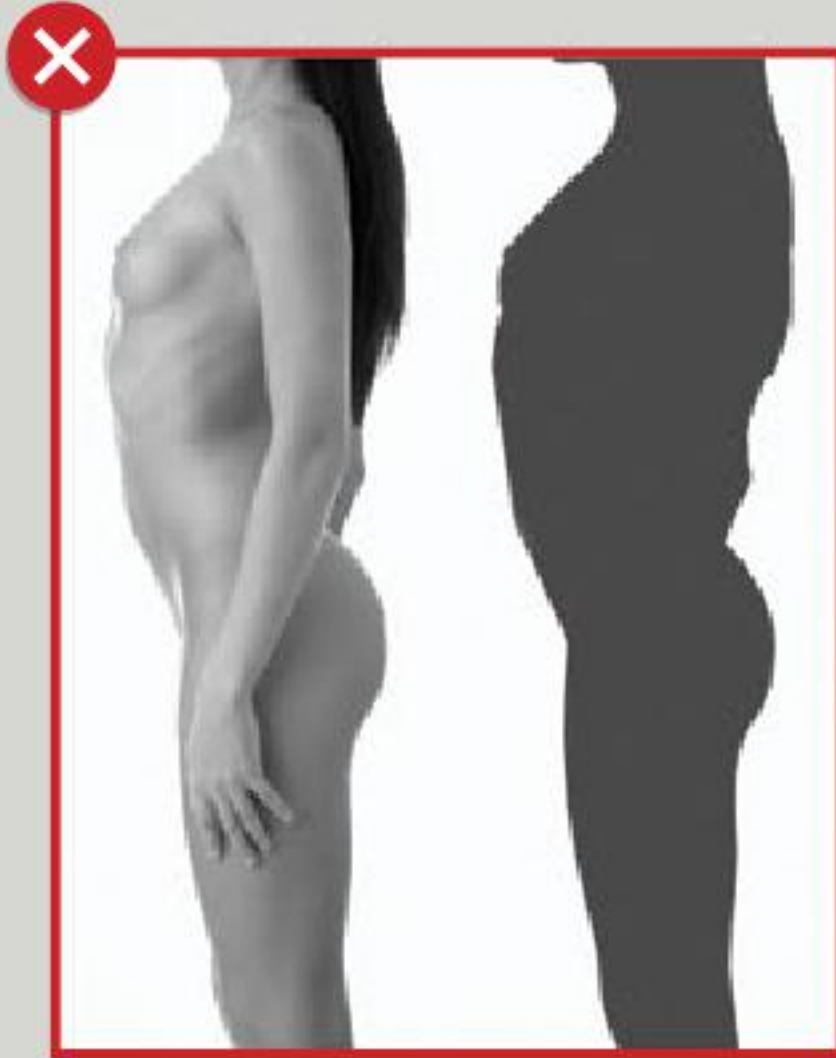


## HOW TO MAKE A FIGURE MORE ATTRACTIVE

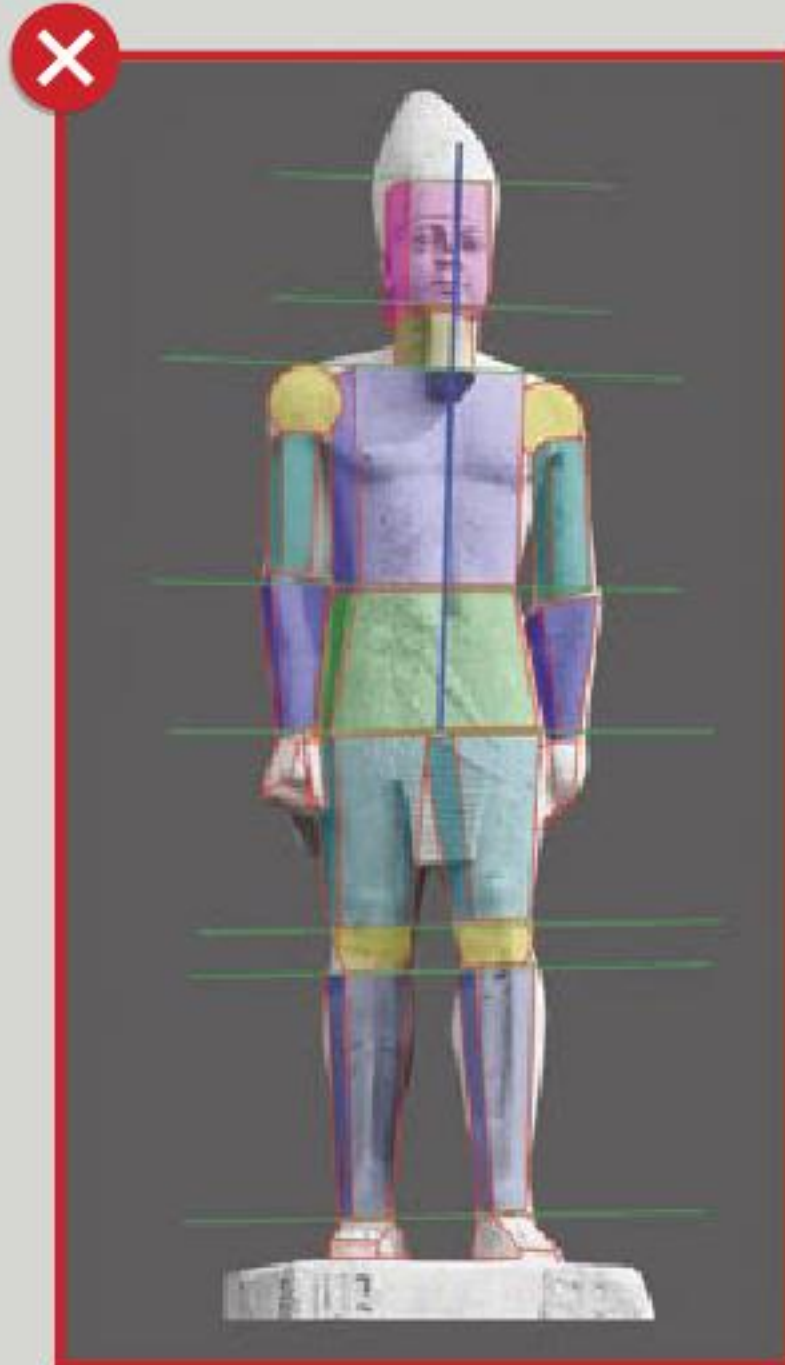




## SILENT KILLER



THE MOST ESSENTIAL ELEMENTS IN FIGURE SCULPTURE NEED TO BE FAR ENOUGH FROM THE BODY. IF YOU CAN'T EASILY DISTINGUISH YOUR CHARACTER BY SILHOUETTE ALONE, THEN RECONSIDER THE COMPOSITION! AN UNCLEAR SILHOUETTE IS THE "SILENT KILLER" OF DESIGN!

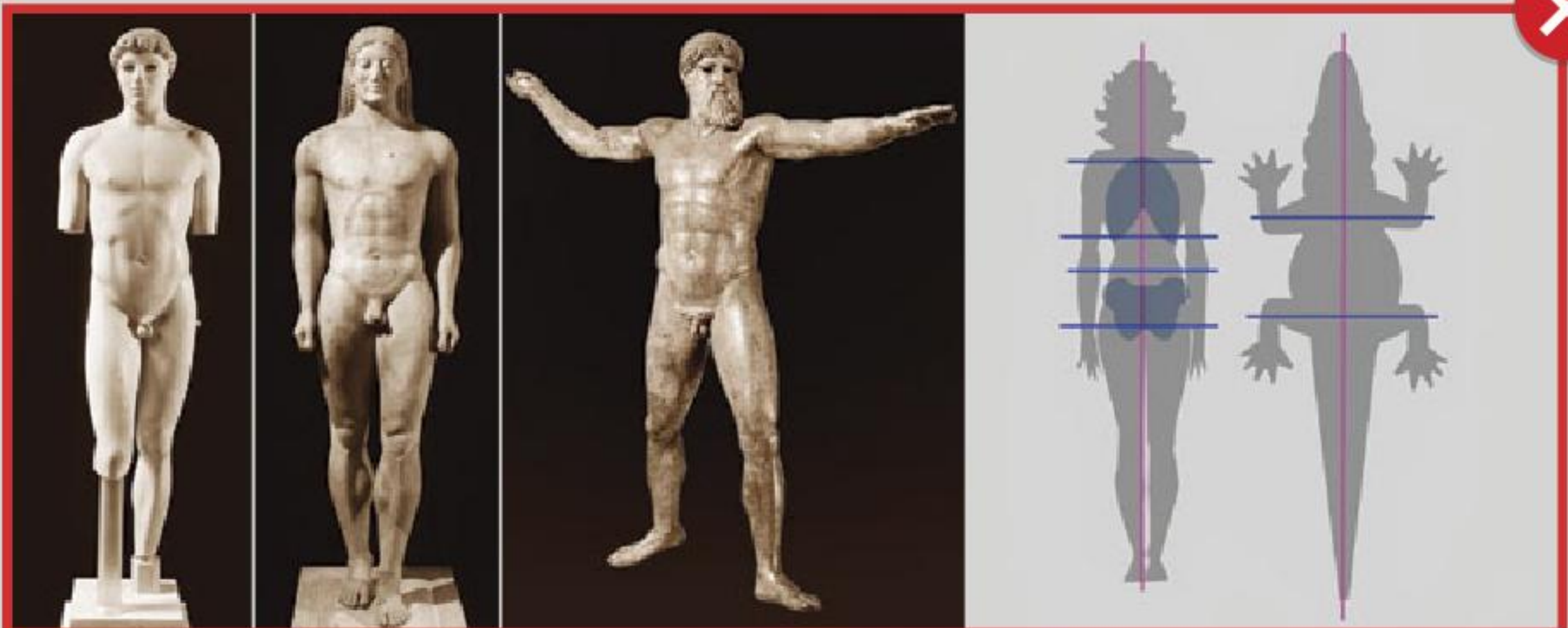
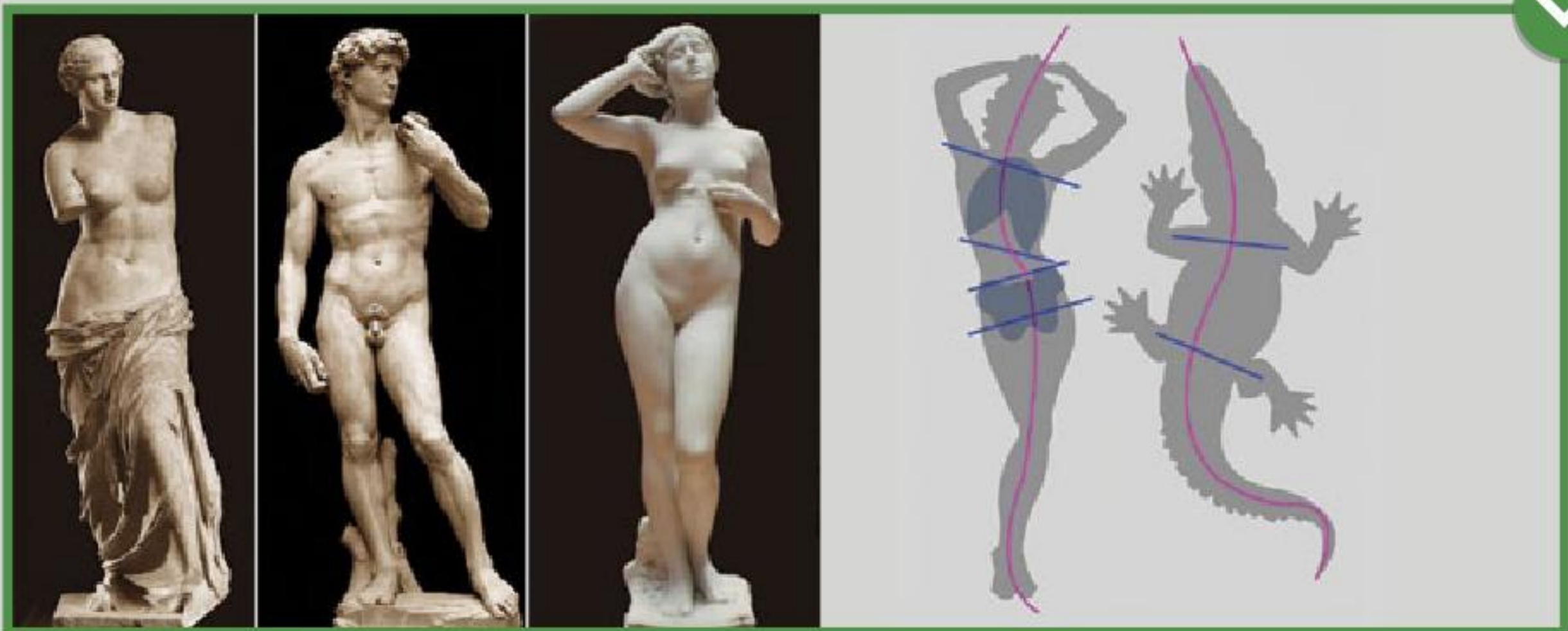


ANOTHER KILLER IS **SYMMETRY**! SYMMETRICAL FIGURE SEEMS LIFELESS AND BORING.



## CONTRAPPOSTO

THIS TERM DESCRIBES THE POSITION OF A FIGURE IN WHICH THE HIPS AND LEGS ARE TURNED IN A DIFFERENT DIRECTION FROM THAT OF THE SHOULDERS AND HEAD; THE FIGURE TWISTS ON ITS OWN VERTICAL AXIS. THE FIGURE'S BODY AND POSTURE IS DEPICTED AS A SINUOUS OR SERPENTINE "S" SHAPE.

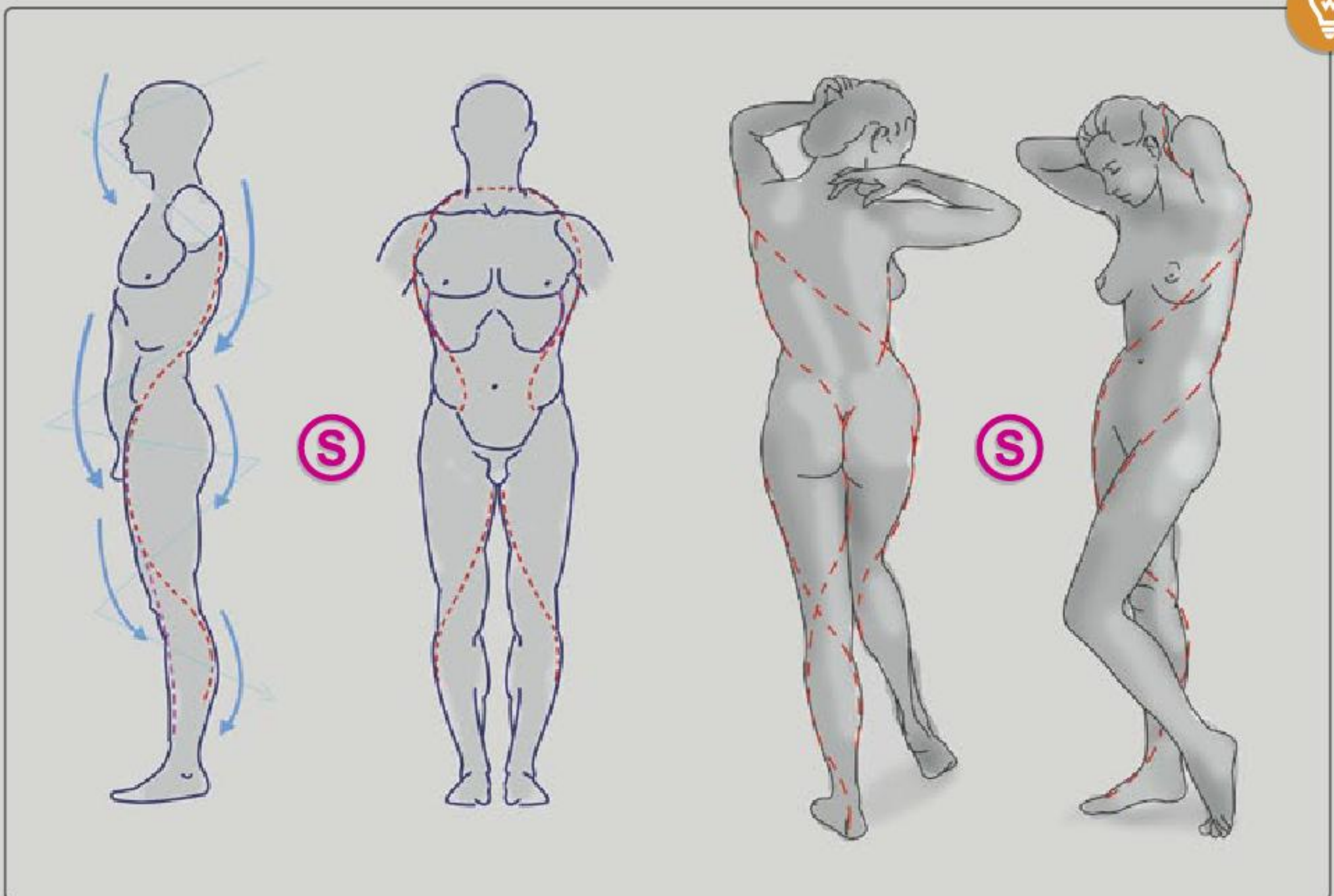




# LAZY "S"



**DRAW IMAGINARY S-SHAPED LINES AND BY FOLLOWING THEM, YOU CAN EASILY CONSTRUCT THE CURVES OF THE BODY.**

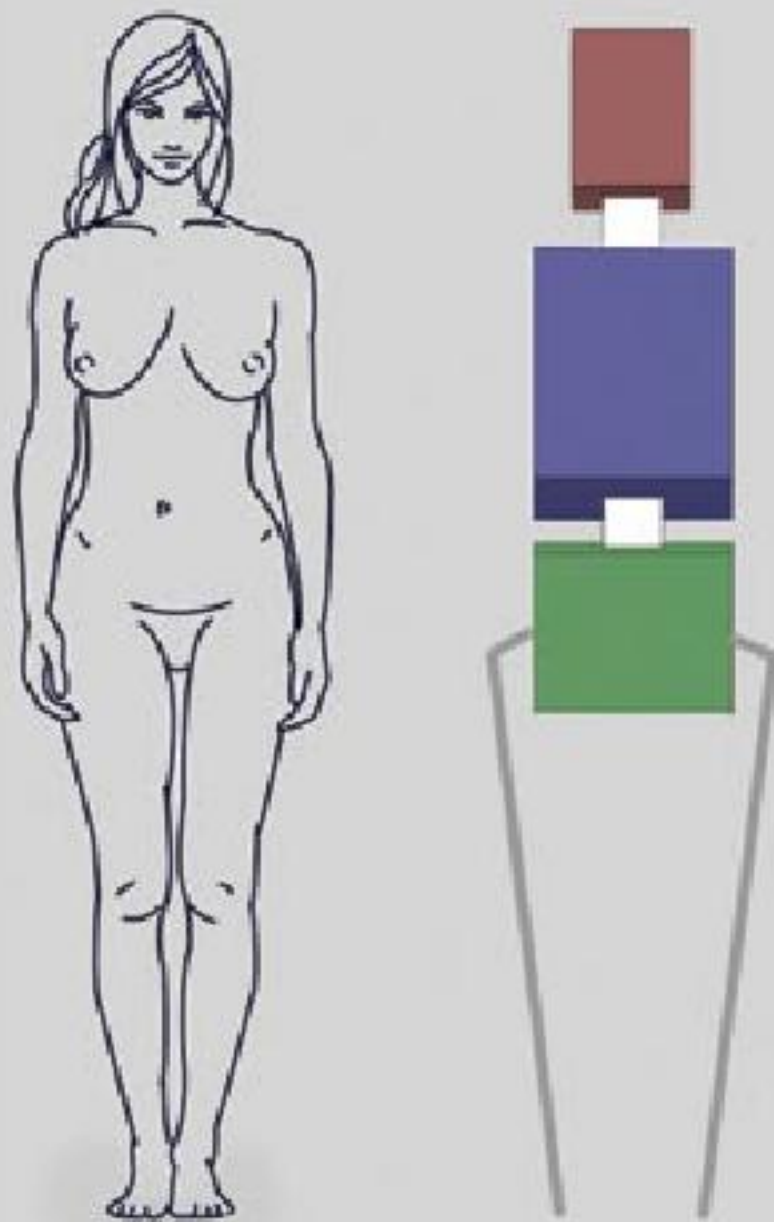




## 5 POSITION COMBINATIONS OF MOVABLE MASSES

i

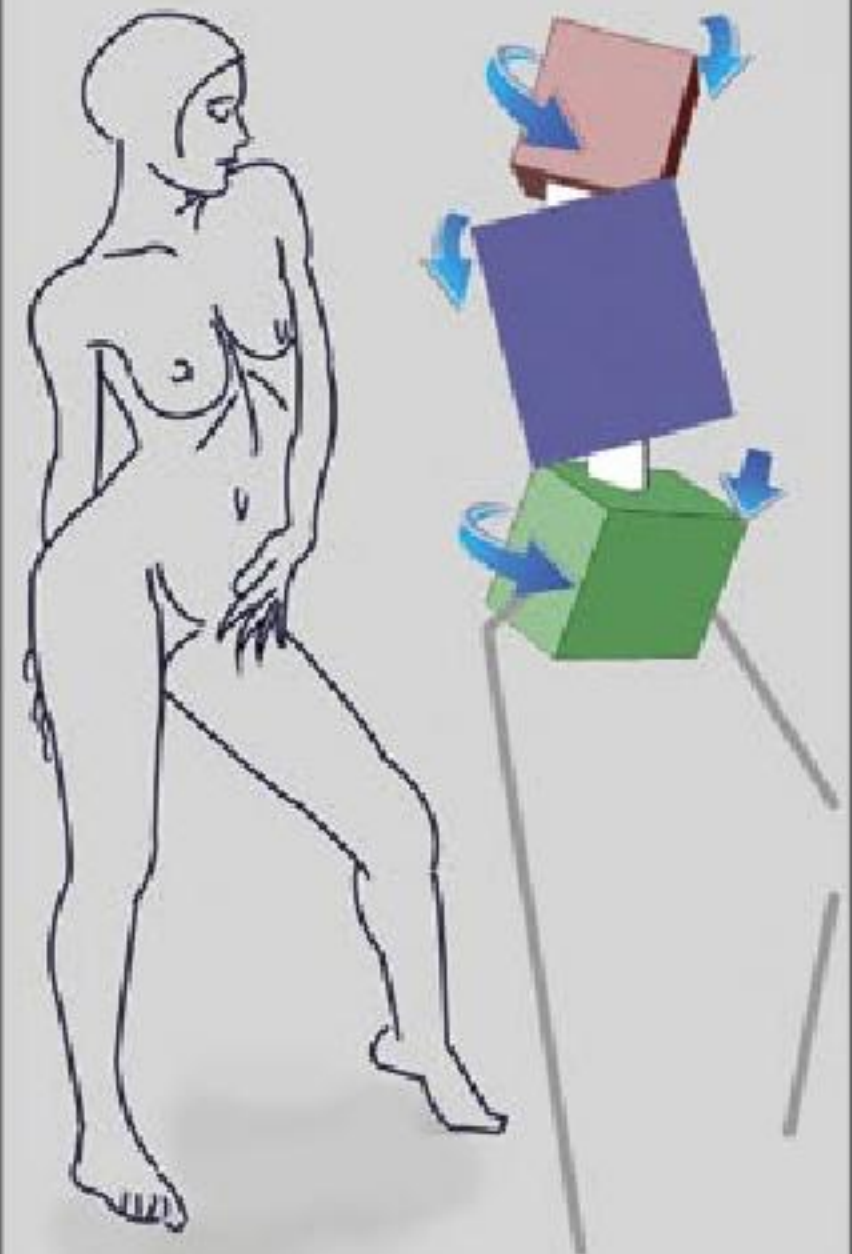
ERECT



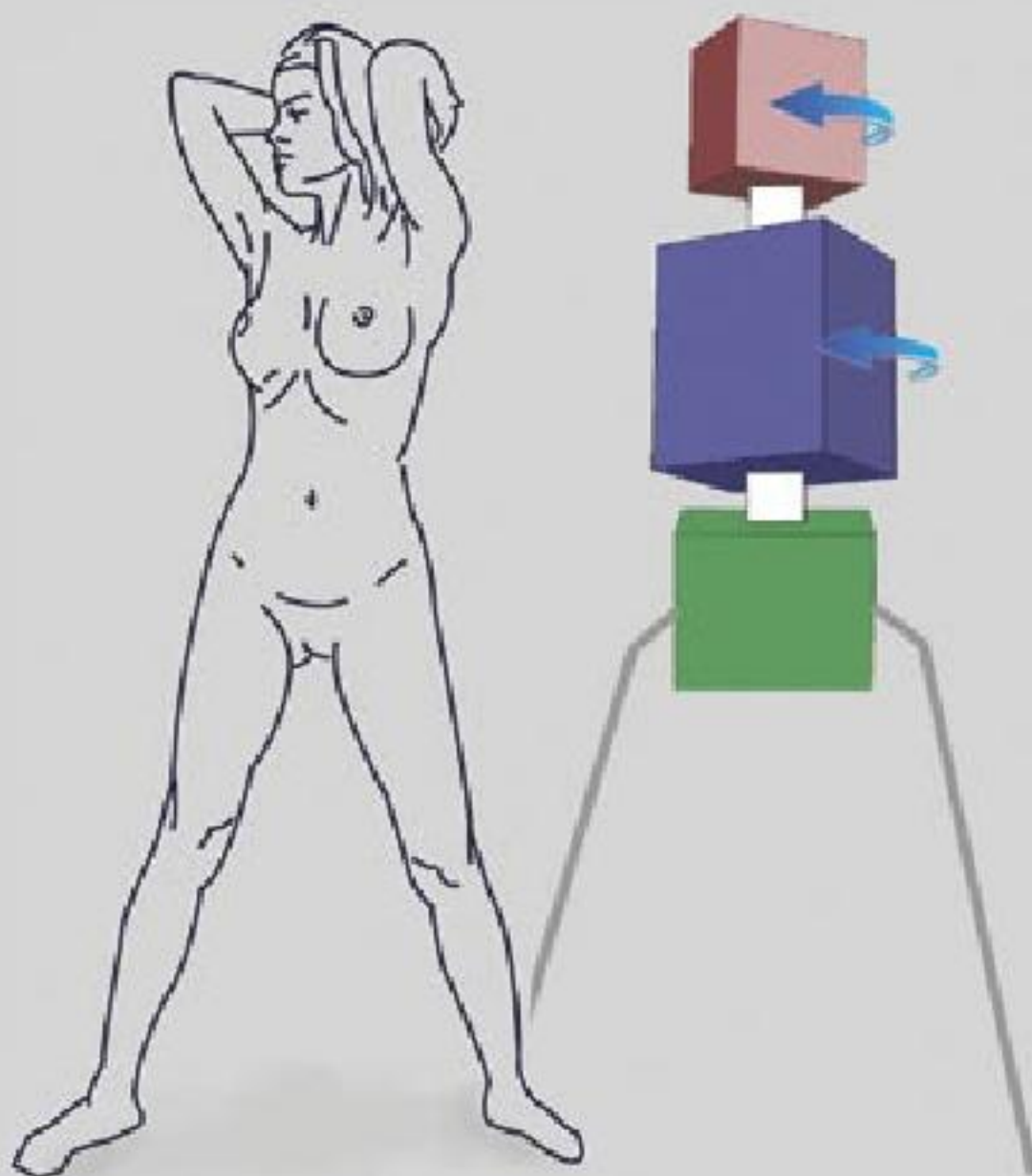
TIPPED BACK



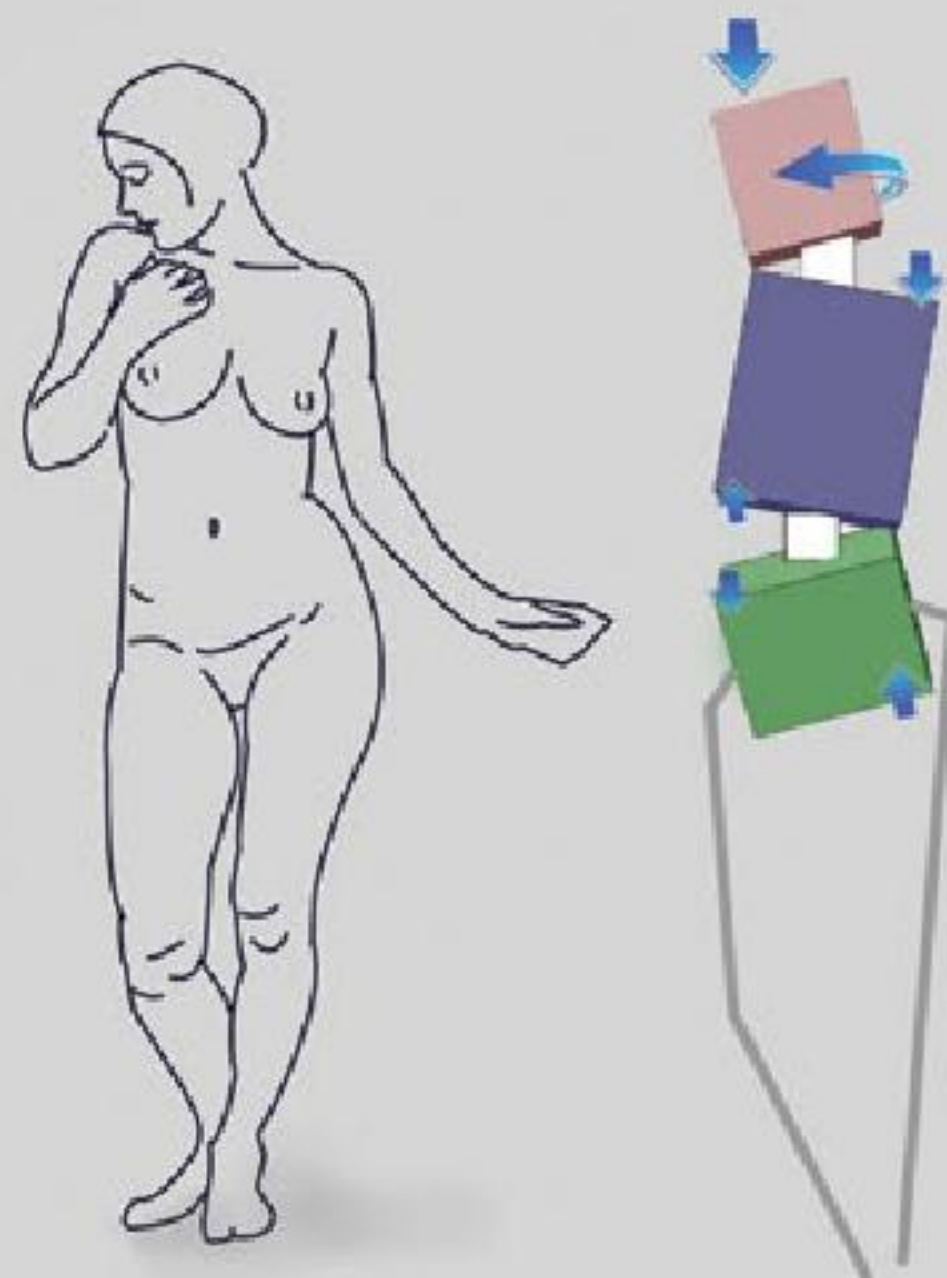
COMBINATION



ROTATED

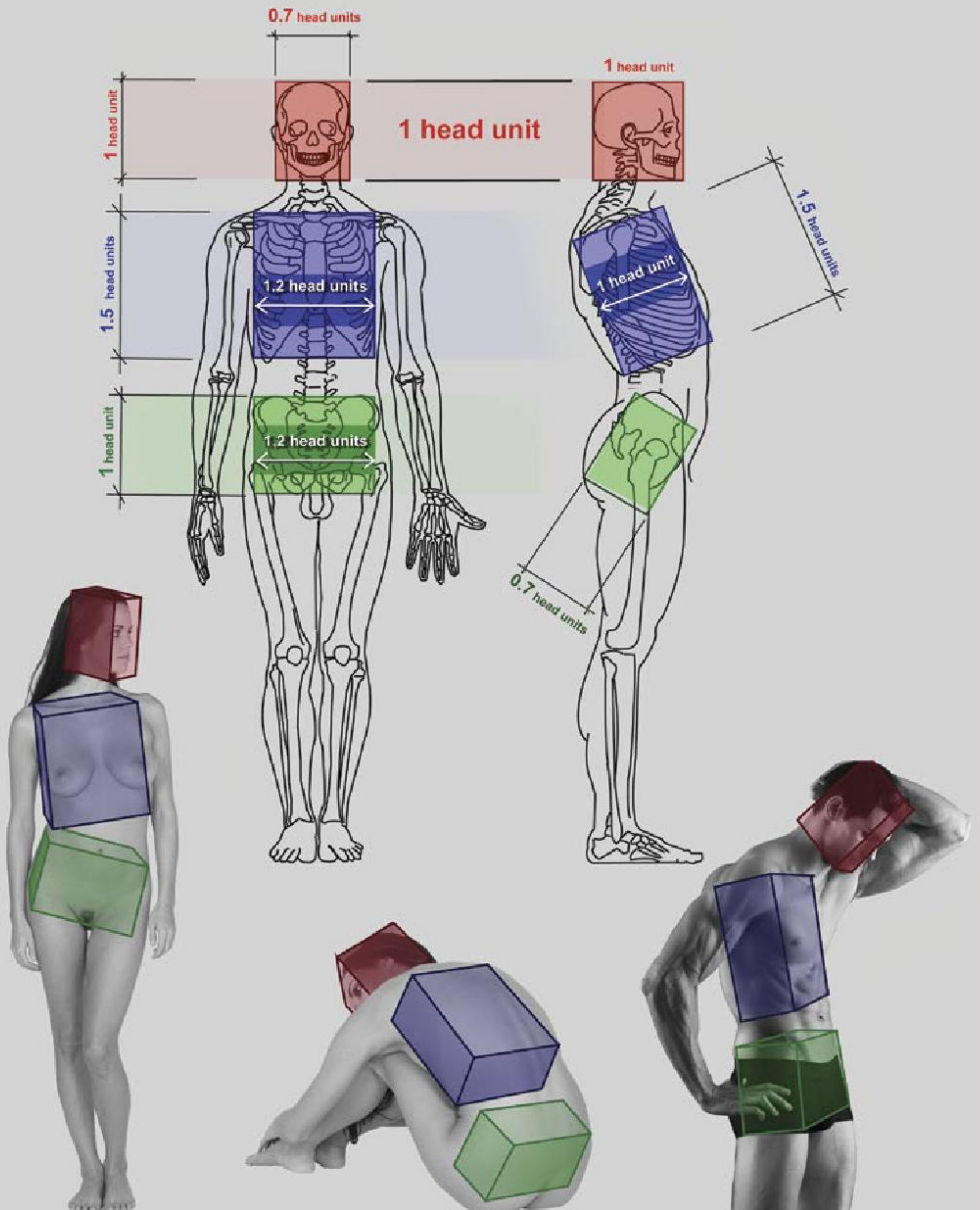


TILTED



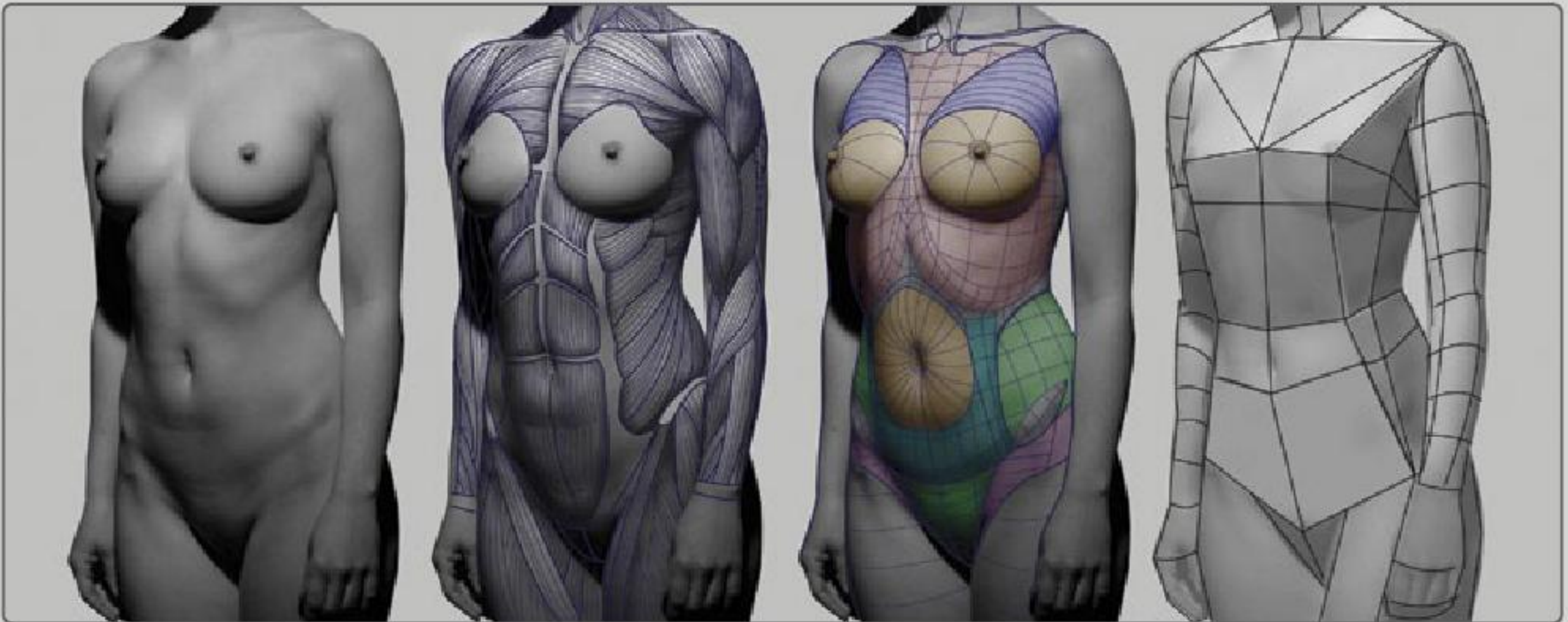


# PROPORTIONS IN HEAD UNITS OF MOVABLE MASSES





## FEMALE TORSO FROM REALISTIC TO SIMPLIFIED

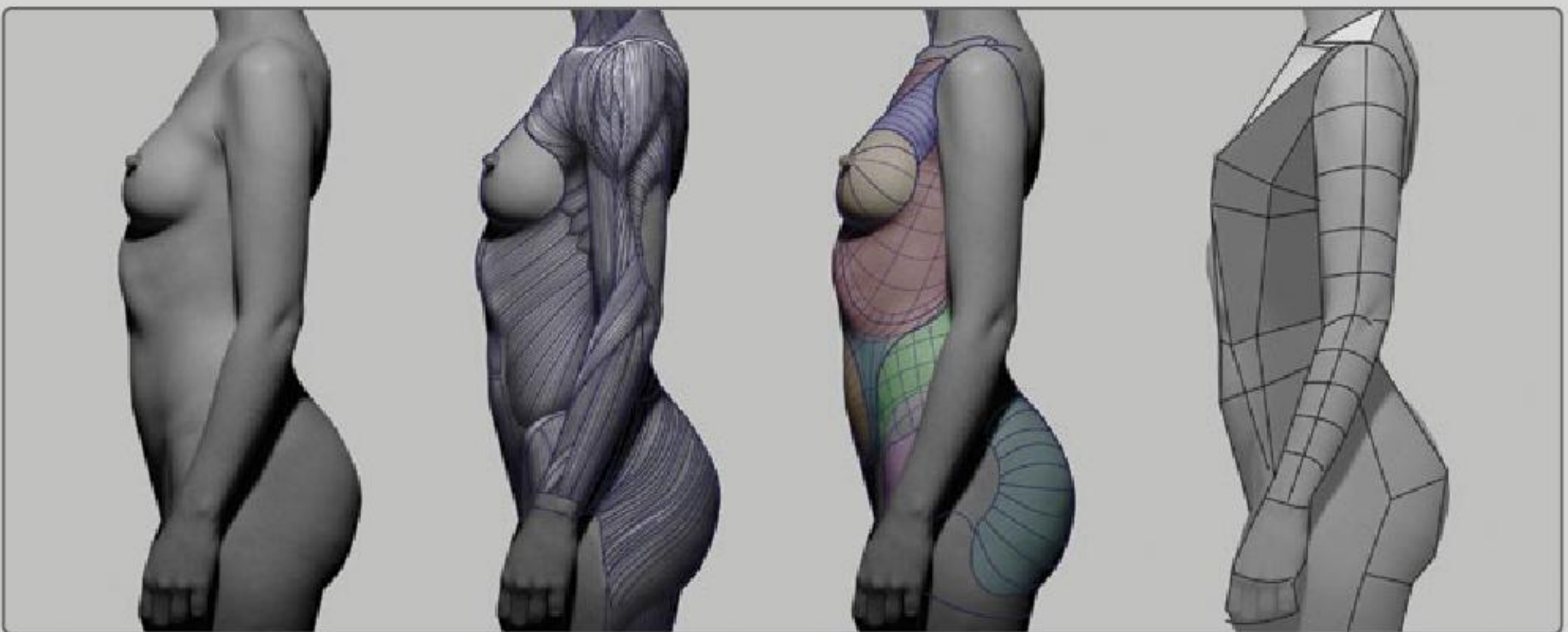


REAL

MUSCLES

SHAPES

BLOCK-OUT





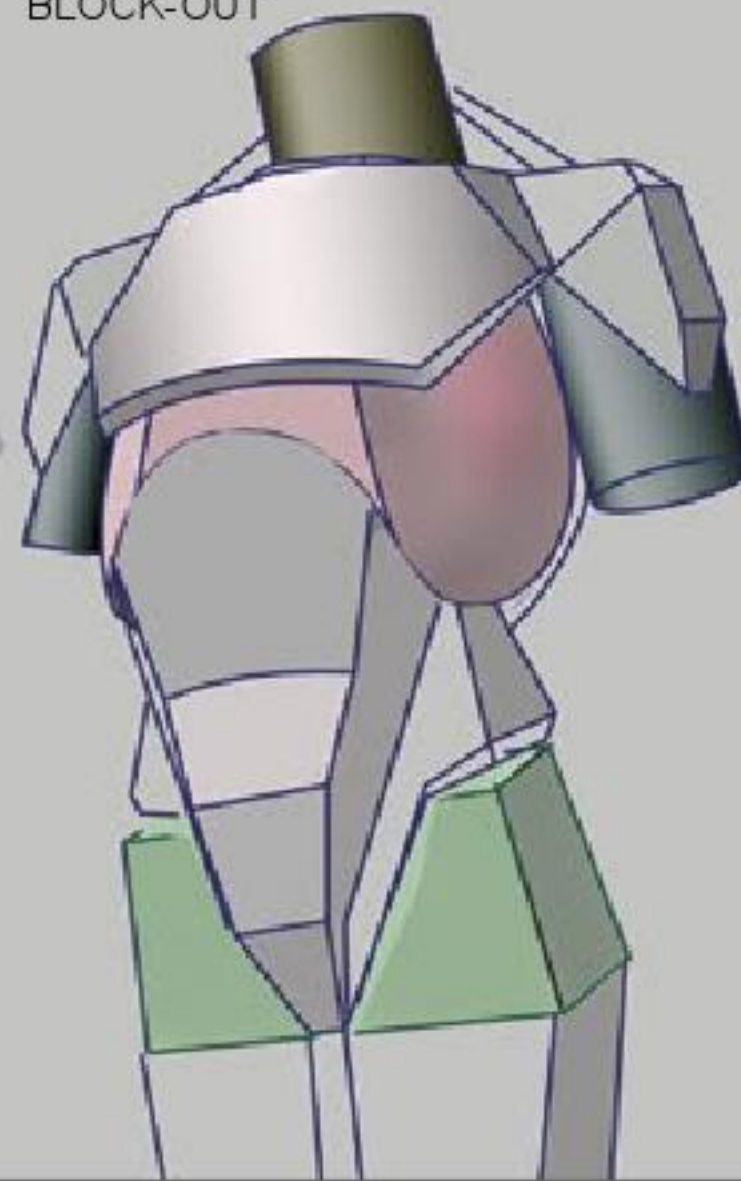
# MALE TORSO FROM REALISTIC TO SIMPLIFIED



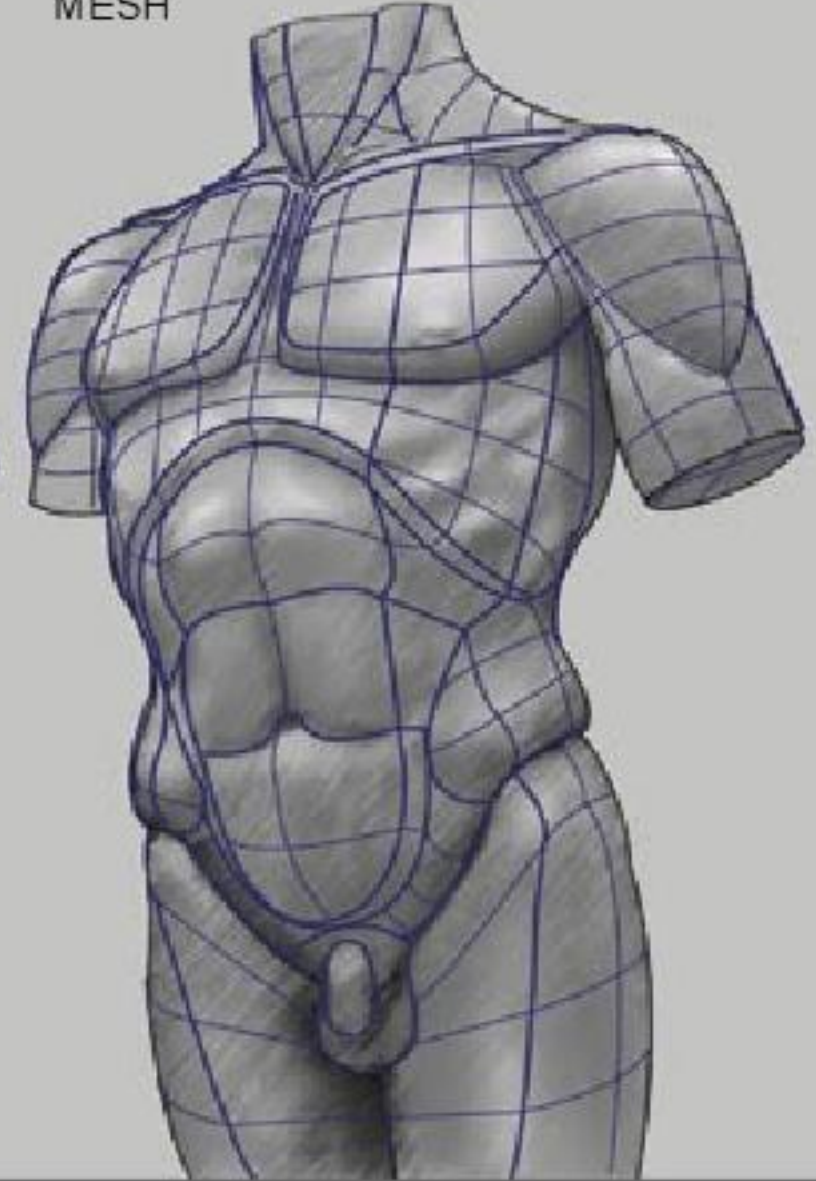
MASSES



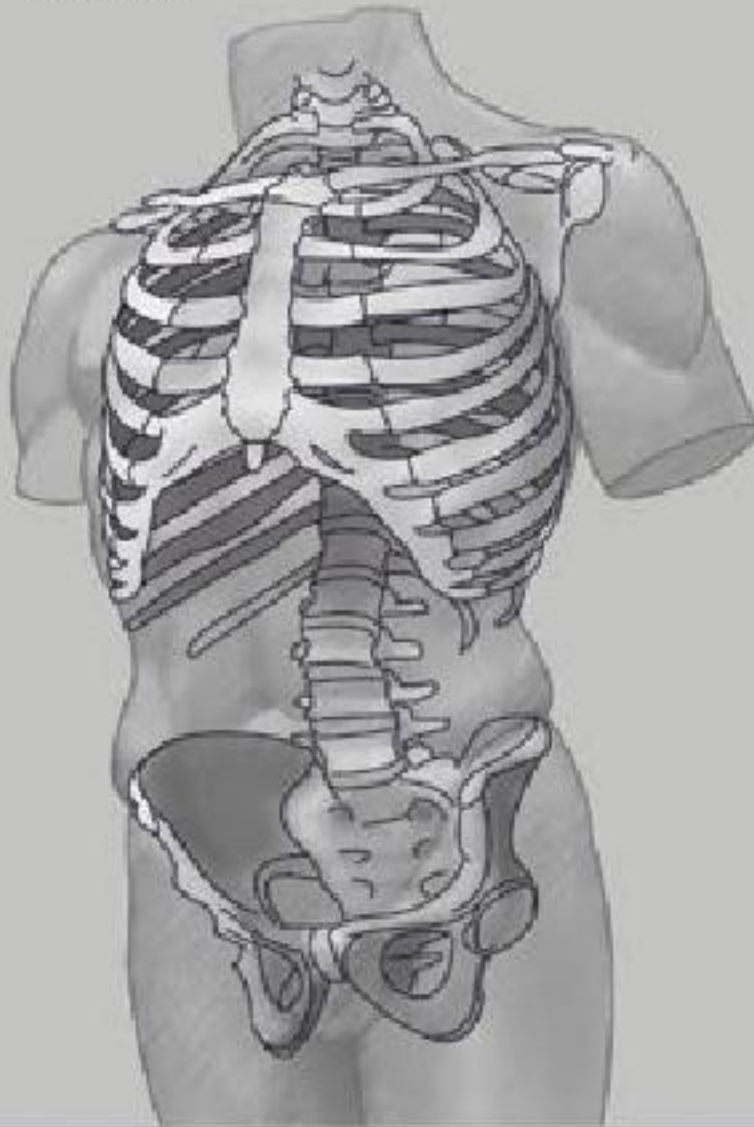
BLOCK-OUT



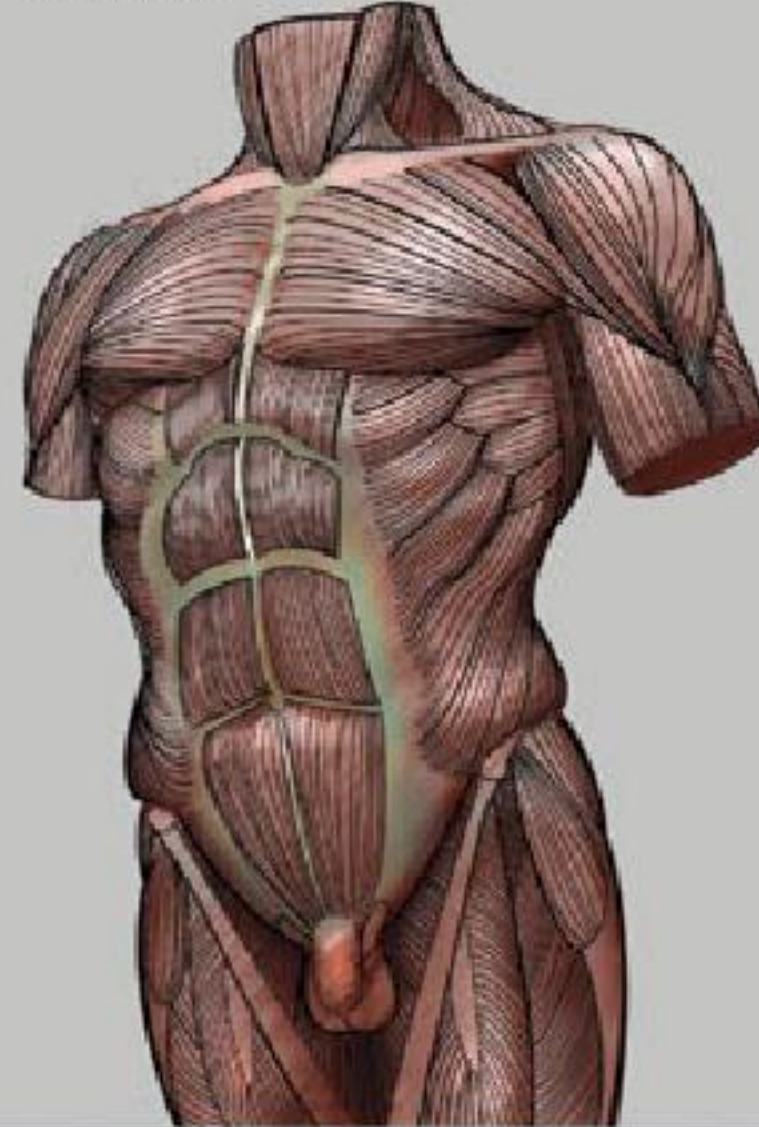
MESH



BONES



MUSCLES

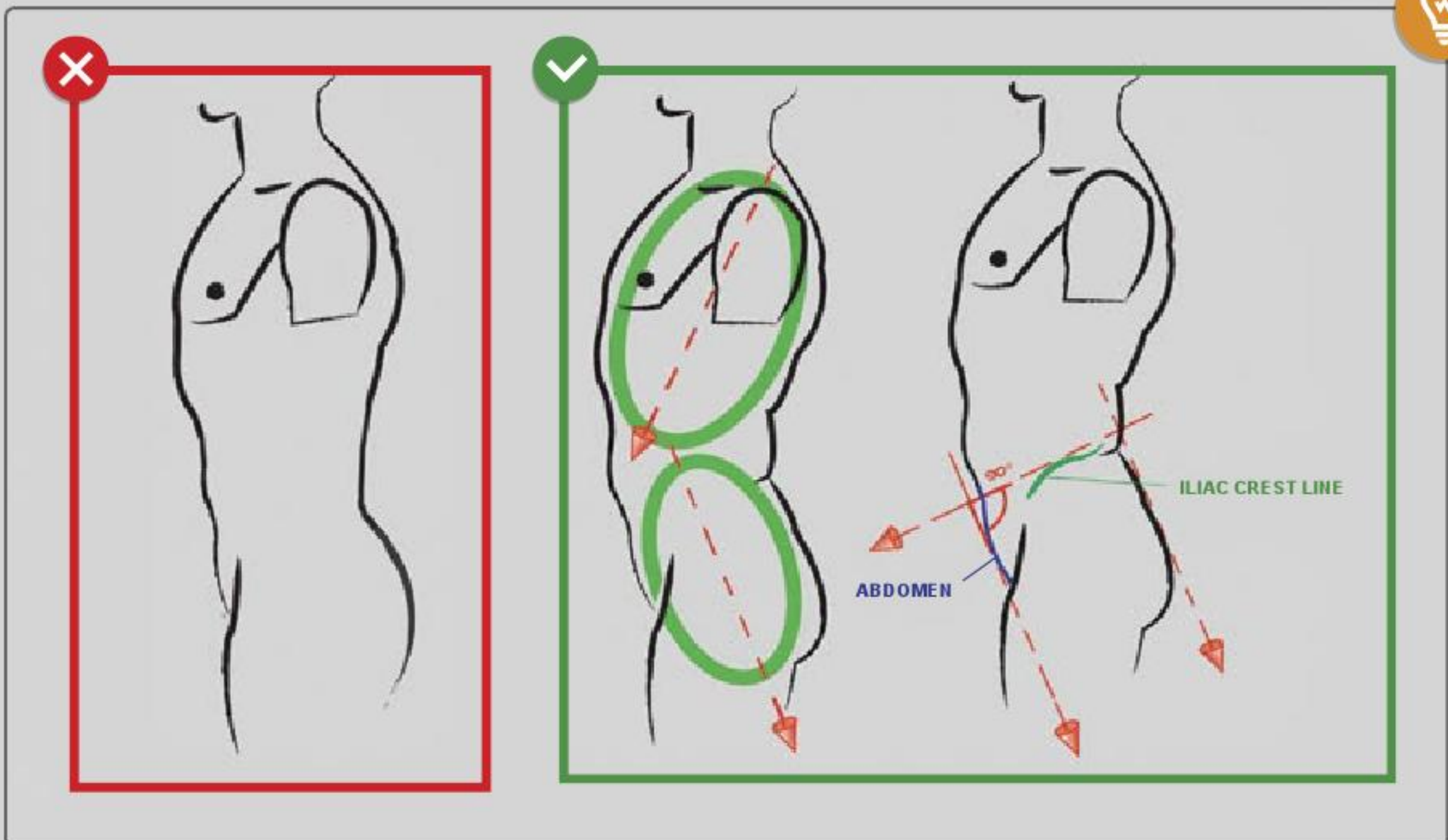
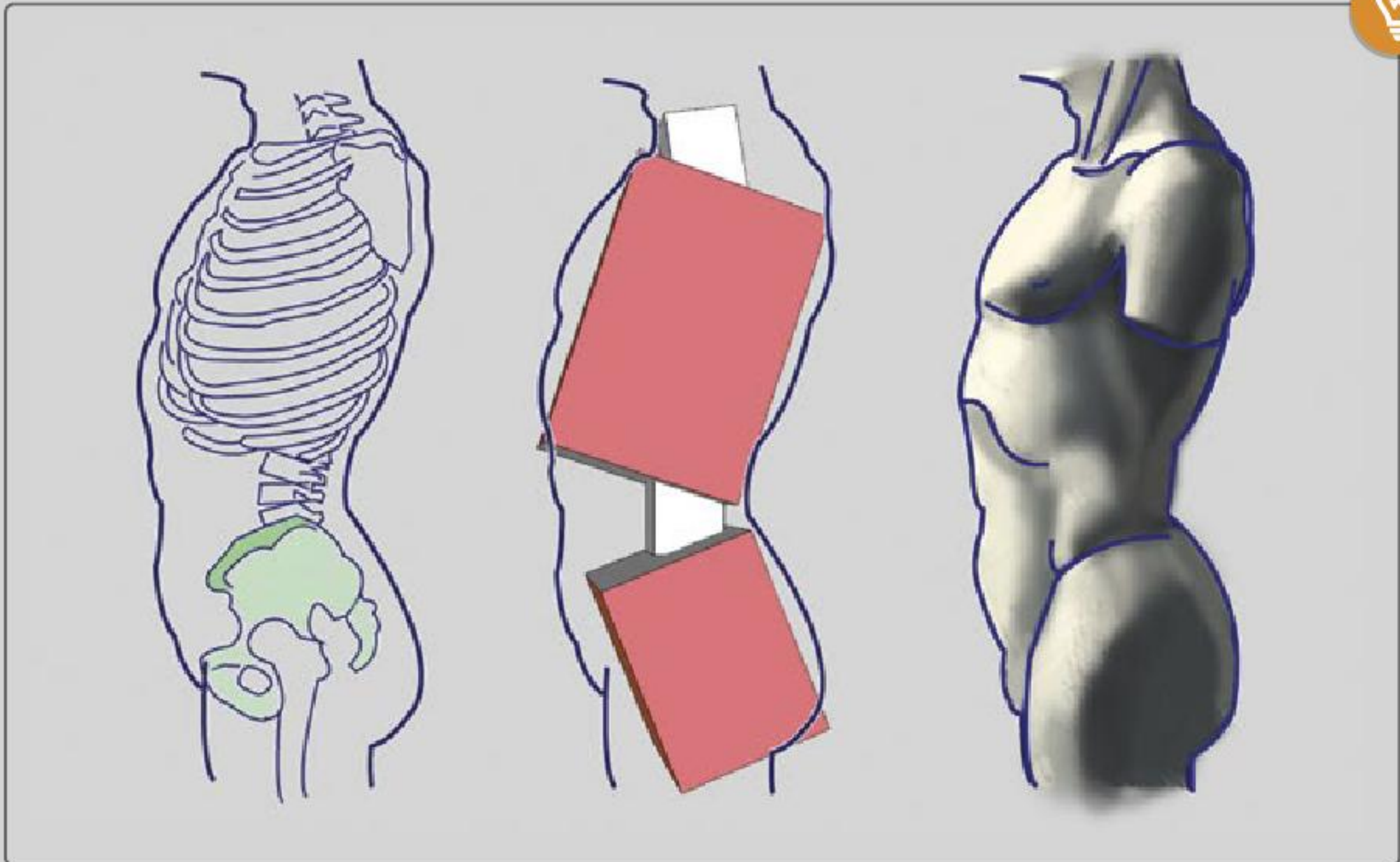


REALISTIC



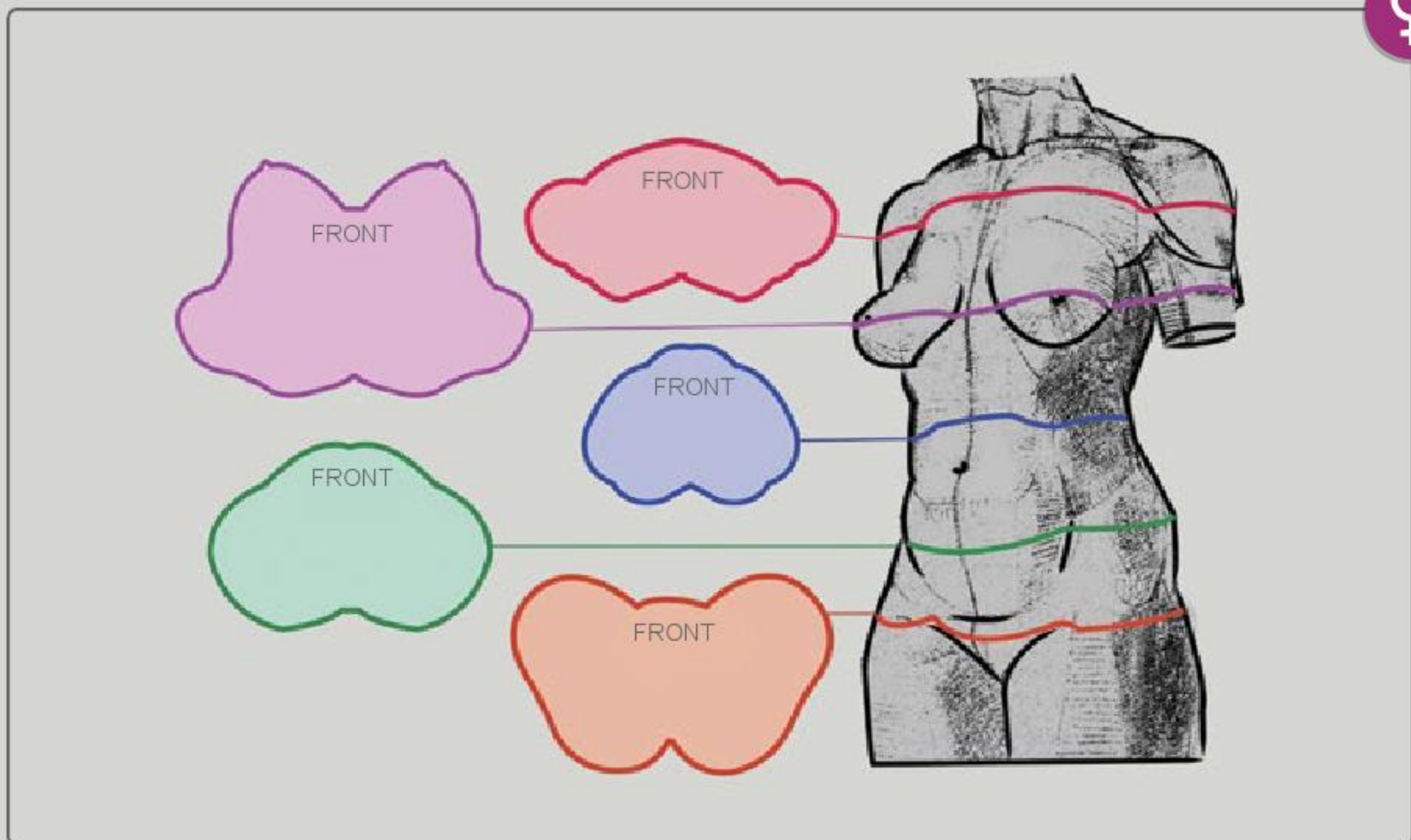
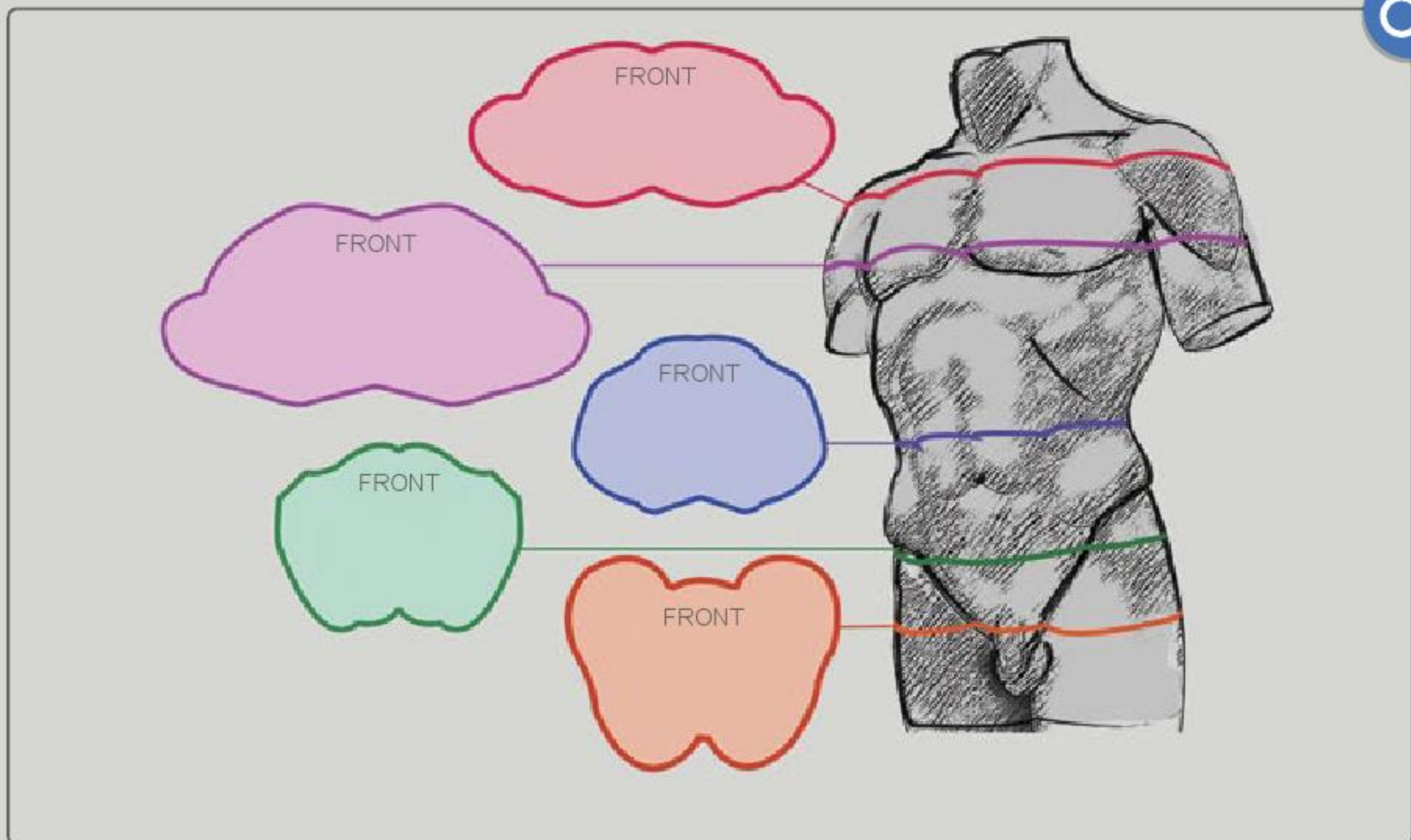


## ANGULAR RELATIONSHIP OF MOVABLE MASSES OF TORSO



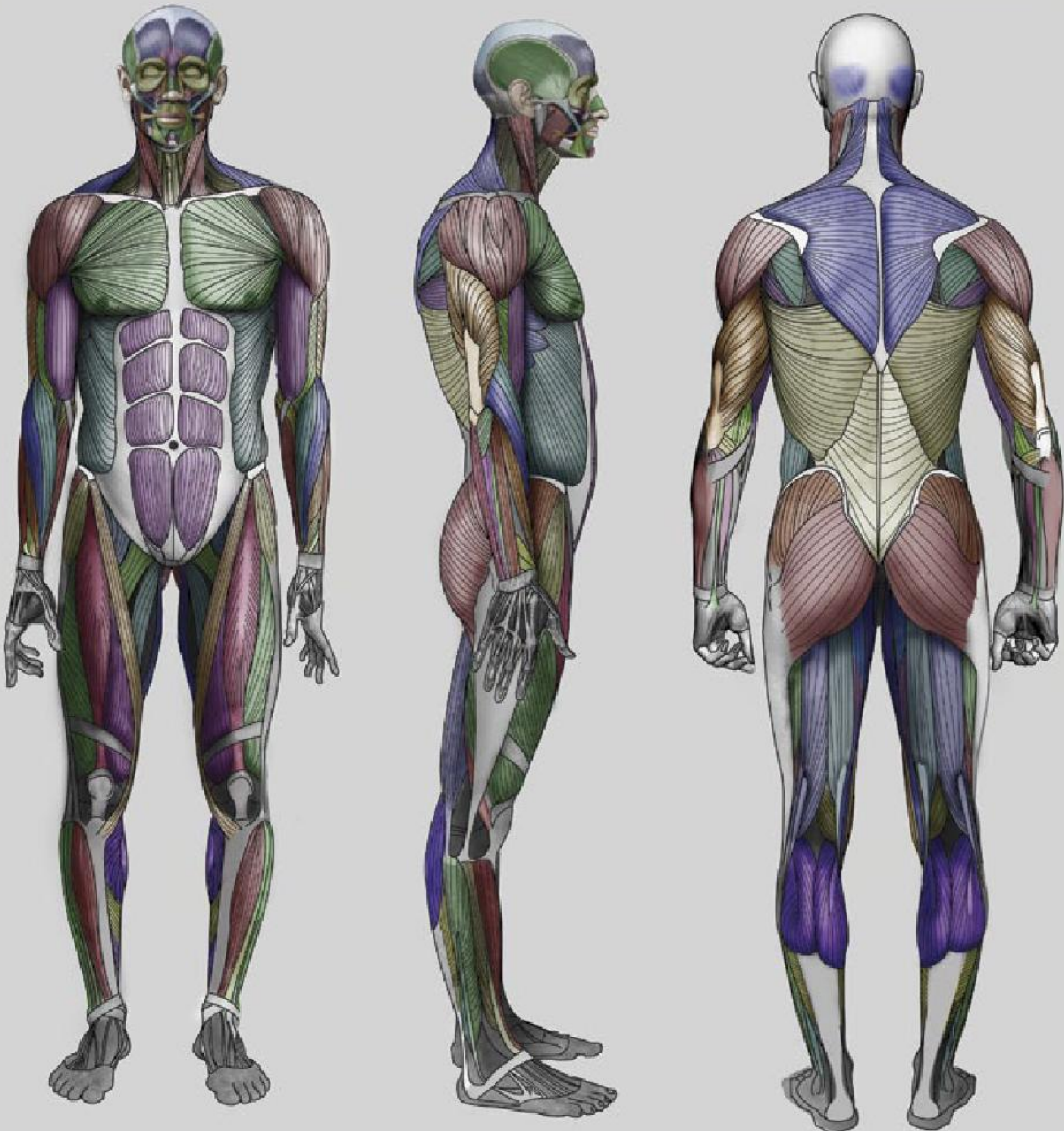


# HORIZONTAL CROSS SECTIONS OF TORSO





## ÉCORCHÉ



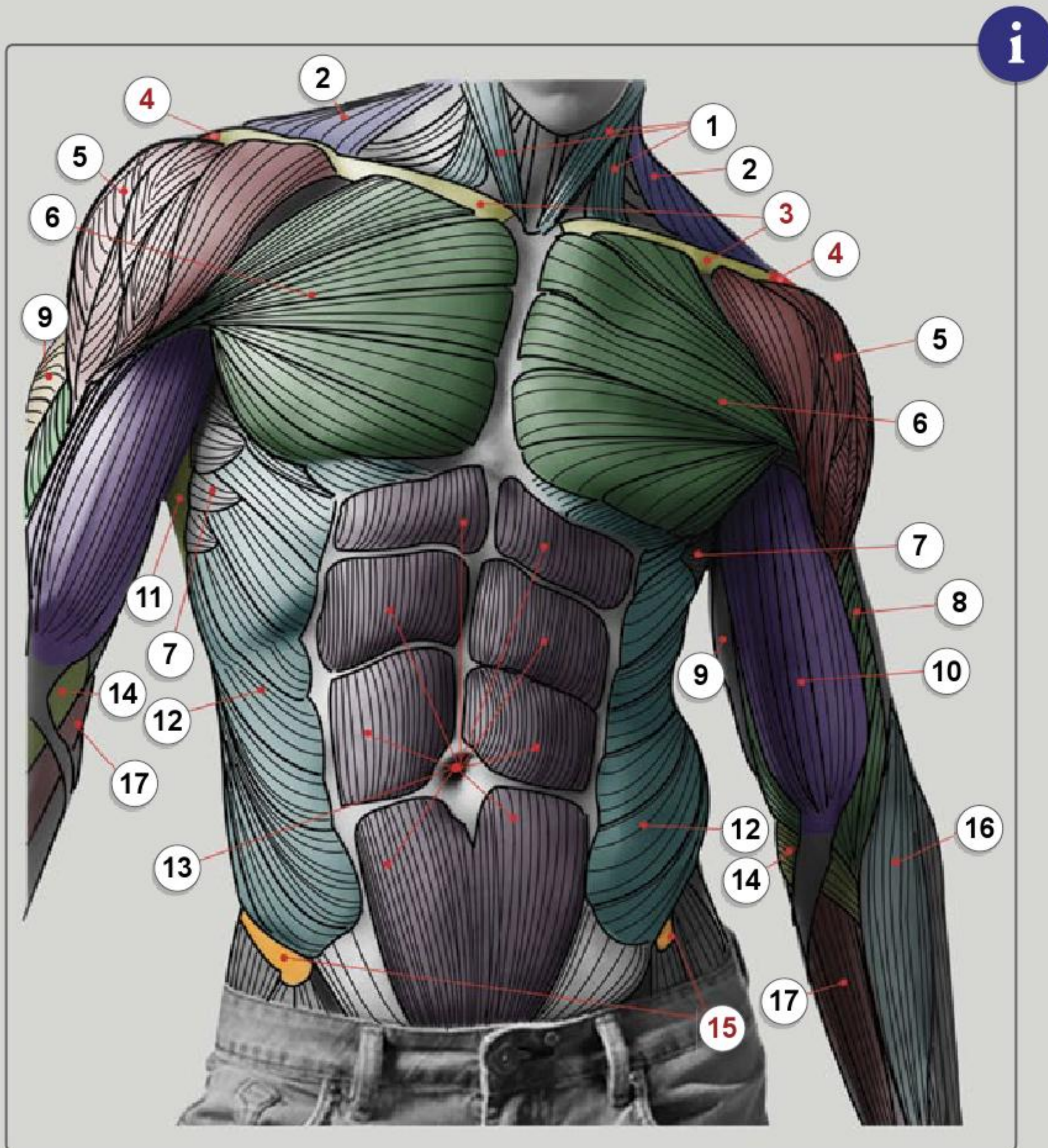


## MALE FIGURE





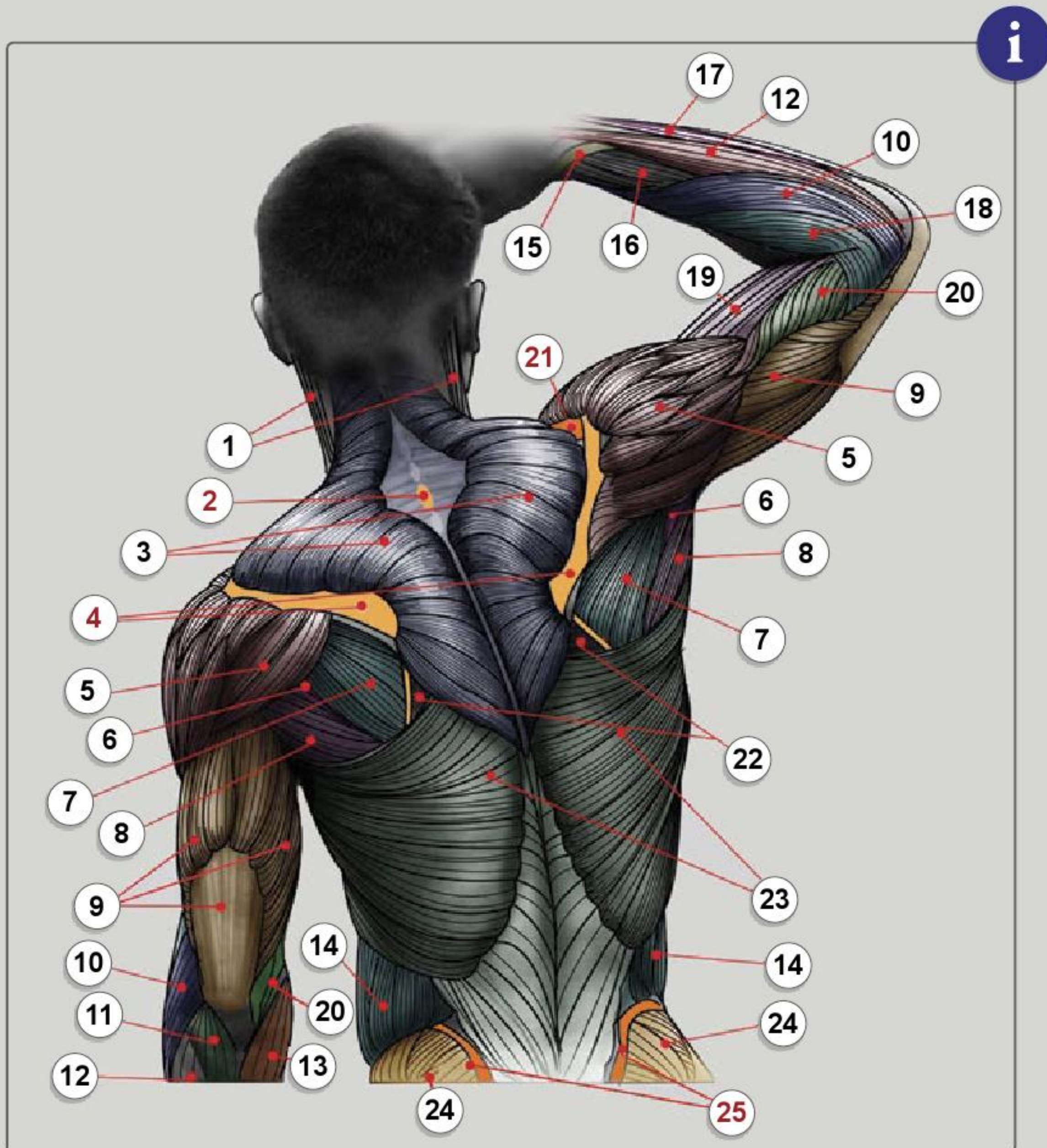
## MAIN MUSCLES AND LANDMARK POINTS OF FRONTAL TORSO



- |                       |                     |                                  |
|-----------------------|---------------------|----------------------------------|
| 1 STERNOCLEIDOMASTOID | 7 SERRATUS ANTERIOR | 13 RECTUS ABDOMINIS              |
| 2 TRAPEZIUS           | 8 BRACHIALIS        | 14 PRONATOR TERES                |
| 3 CLAVICLE            | 9 TRICEPS BRACHII   | 15 ANTERIOR SUPERIOR ILIAC SPINE |
| 4 SHOULDER BLADE      | 10 BICEPS BRACHII   | 16 BRACHIORADIALIS               |
| 5 DELTOID             | 11 LATISSIMUS DORSI | 17 FLEXOR CARPI RADIALIS         |
| 6 PECTORALIS          | 12 EXTERNAL OBLIQUE |                                  |



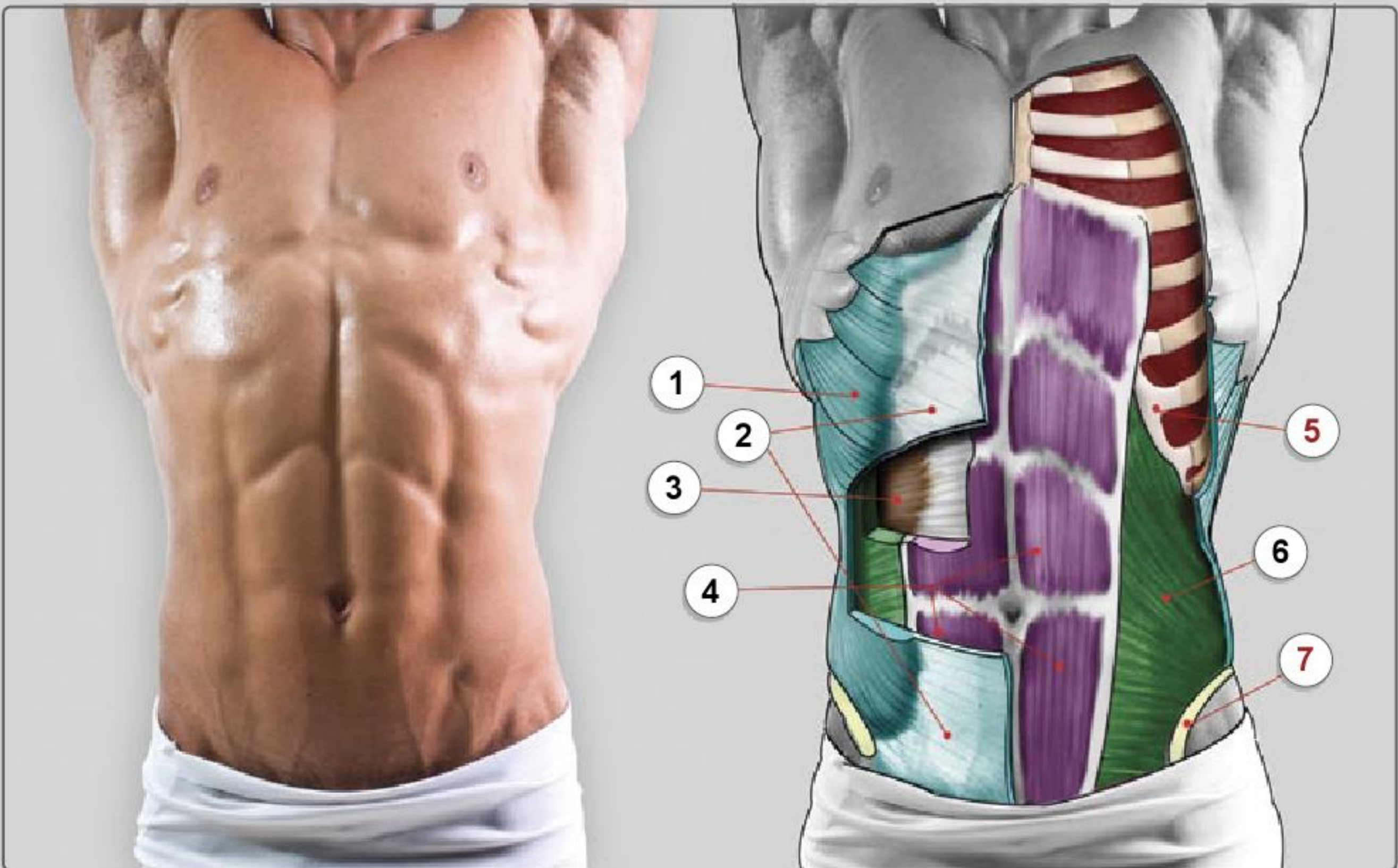
## MAIN MUSCLES AND BONES OF THE BACK



|                       |                                   |                                   |
|-----------------------|-----------------------------------|-----------------------------------|
| 1 STERNOCLEIDOMASTOID | 10 EXTENSOR CARPI RADIALIS LONGUS | 19 BICEPS BRACHII                 |
| 2 7TH VERTEBRAE       | 11 ANCONEUS                       | 20 BRACHIALIS                     |
| 3 TRAPEZIUS           | 12 EXTENSOR DIGITORUM             | 21 CLAVICLE                       |
| 4 SPINE OF SCAPULA    | 13 FLEXOR CARPI ULNARIS           | 22 RHOMBOID MAJOR                 |
| 5 DELTOID             | 14 EXTERNAL OBLIQUE               | 23 LATISSIMUS DORSI               |
| 6 TERES MINOR         | 15 ABDUCTOR POLLICIS LONGUS       | 24 GLUTEUS MAXIMUS                |
| 7 INFRASPINATUS       | 16 EXTENSOR CARPI RADIALIS BREVIS | 25 POSTERIOR SUPERIOR ILIAC SPINE |
| 8 TERES MAJOR         | 17 EXTENSOR CARPI ULNARIS         |                                   |
| 9 TRICEPS BRACHII     | 18 BRACHIORADIALIS                |                                   |



## ABDOMINAL MUSCLES



i

- 1 **EXTERNAL OBLIQUE:** LOCATED ON SIDE AND FRONT OF ABDOMEN
- 2 **APONEUROSIS OF EXTERNAL OBLIQUE:** BROAD, FLAT, TENDINOUS PORTION OF **EXTERNAL OBLIQUE** MUSCLE
- 3 **TRANSVERSUS ABDOMINIS:** LOCATED UNDER **OBLIQUES**, IT IS THE DEEPEST OF ABDOMINAL MUSCLES AND WRAPS AROUND SPINE FOR PROTECTION AND STABILITY
- 4 **RECTUS ABDOMINIS:** ALSO KNOWN AS “**ABS**” OR **SIX-PACK** – LOCATED ALONG FRONT OF THE ABDOMEN. THIS IS THE MOST WELL-KNOWN ABDOMINAL MUSCLE
- 5 **RIB CAGE** (THORACIC CAGE OR THORAX)
- 6 **INTERNAL ABDOMINAL OBLIQUE:** LOCATED UNDER **EXTERNAL OBLIQUES** AND RUNS IN THE OPPOSITE DIRECTION
- 7 **WING OF ILIUM** – COMMONLY CALLED “**HIP BONE**” (ILIAC CREST)



## IS A “SIX-PACK” REALLY AN “EIGHT-PACK”?



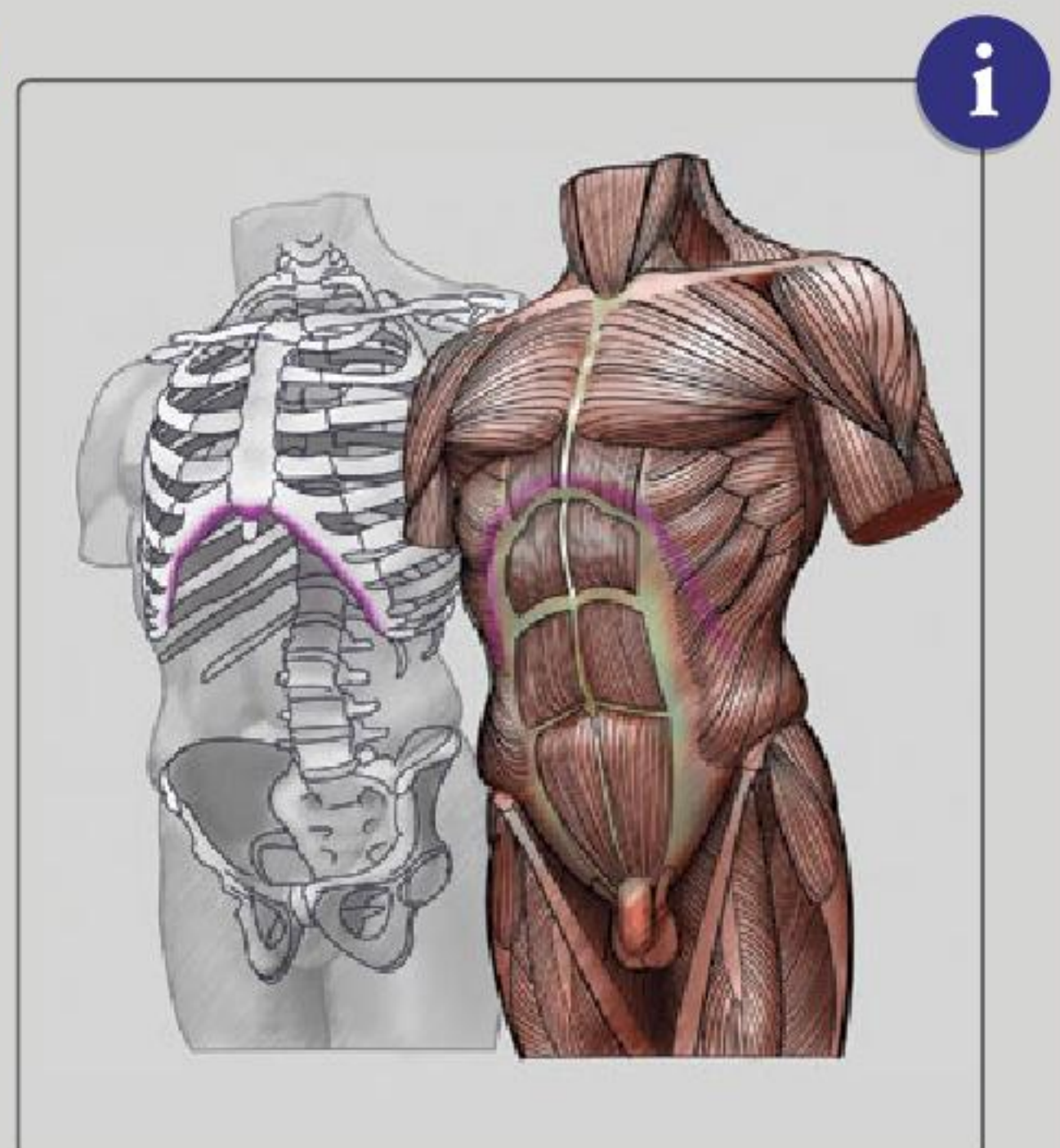
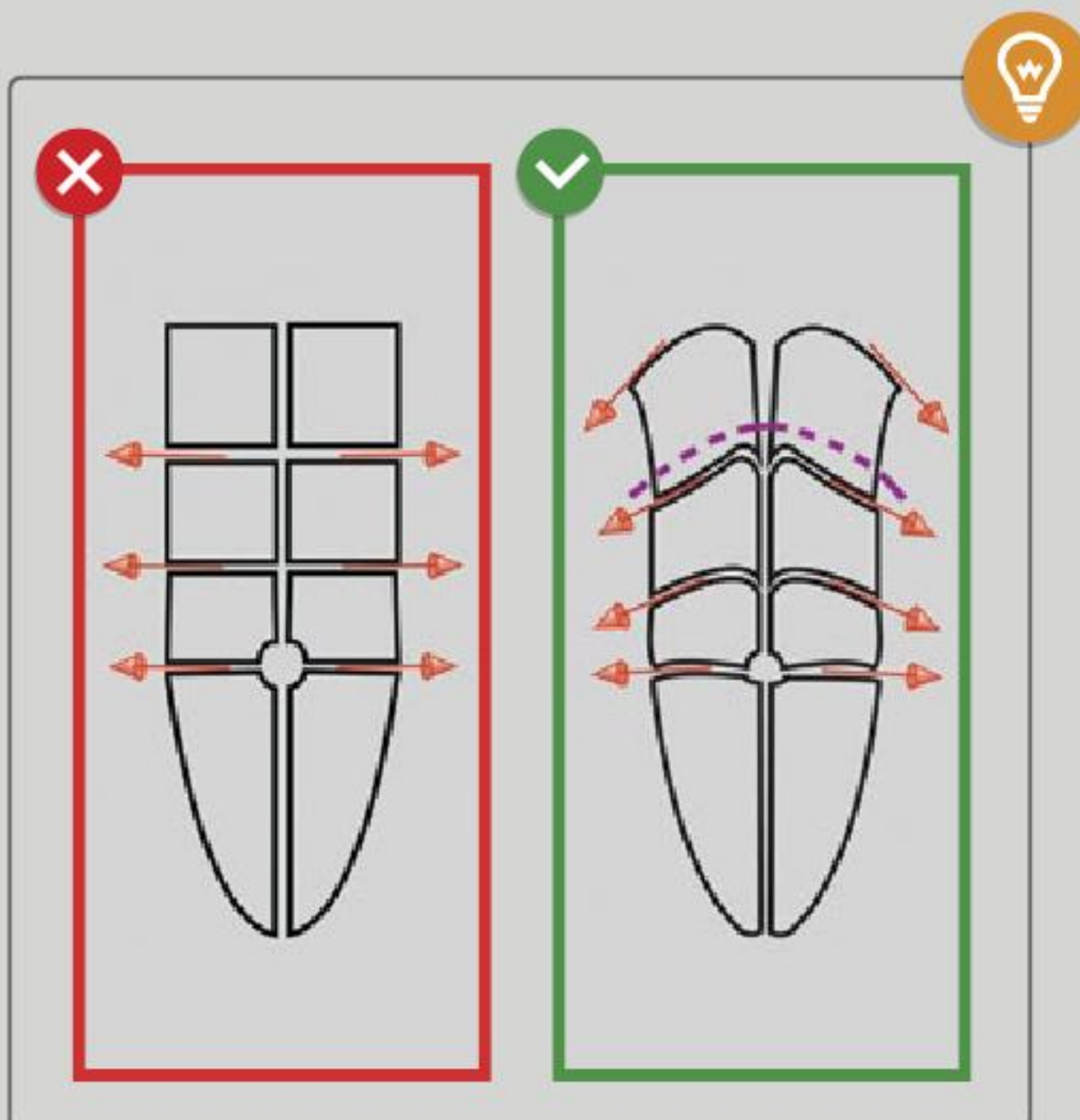
CLASSIC SCULPTURE



FITNESS

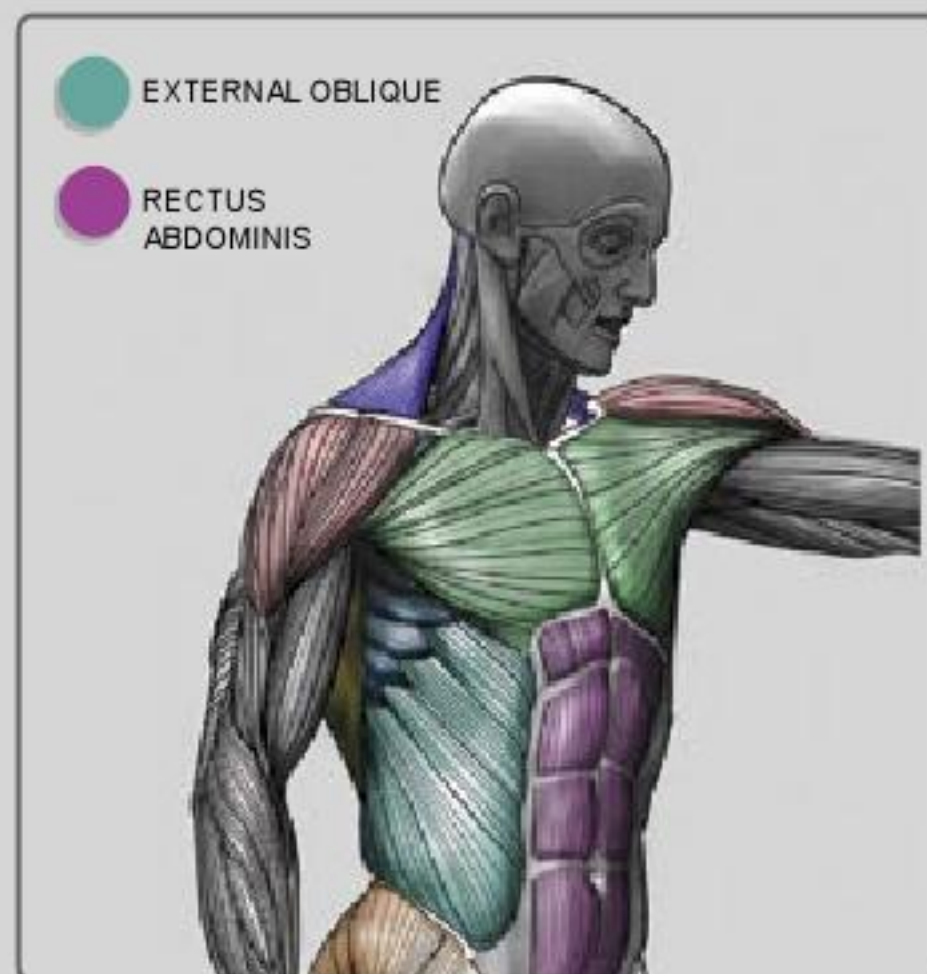
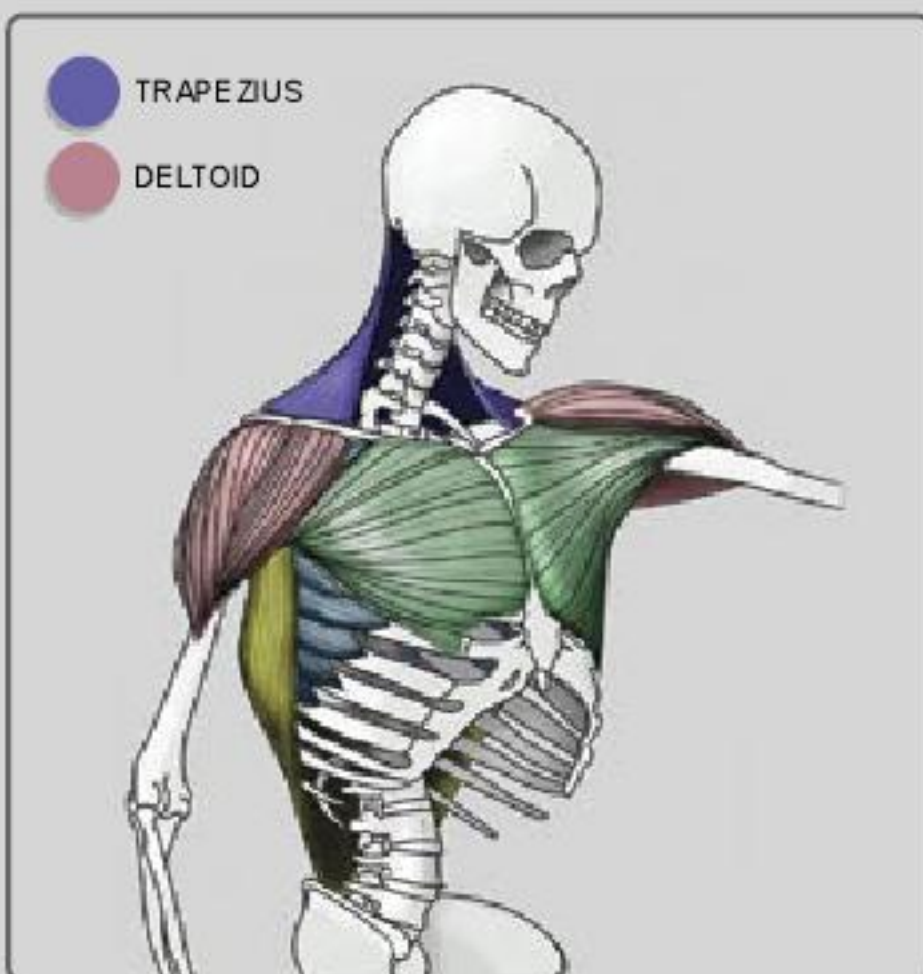
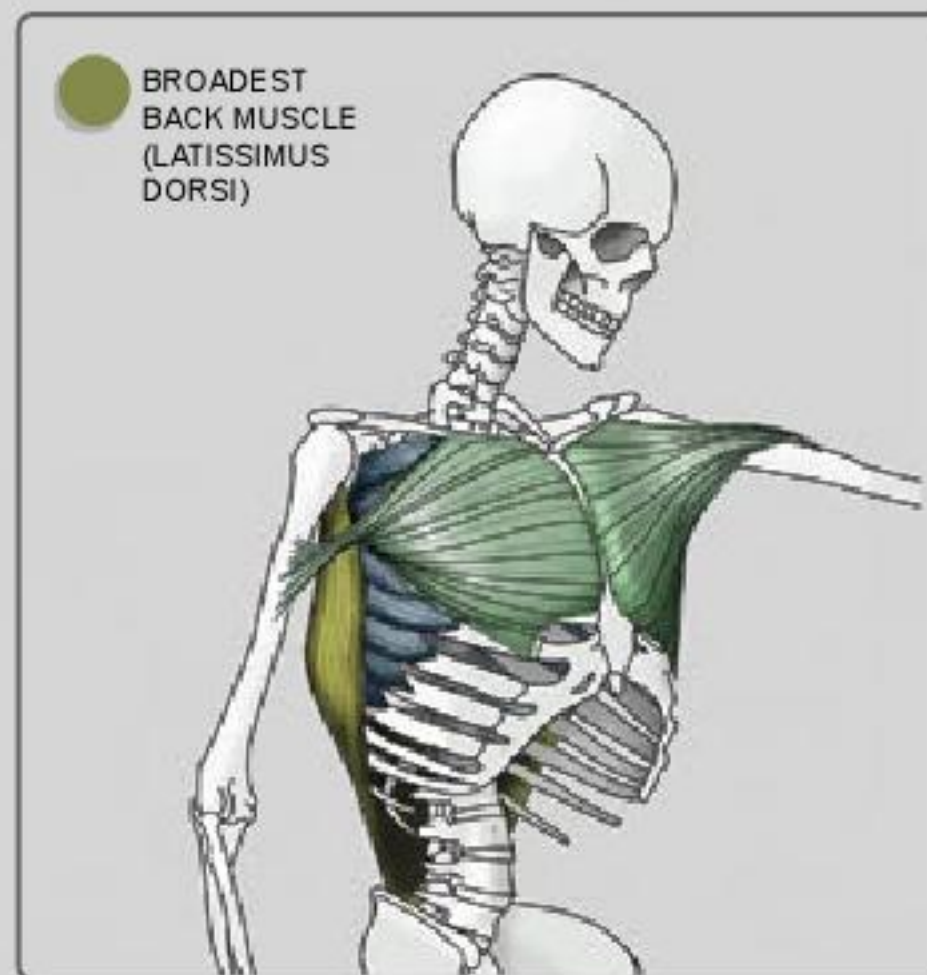
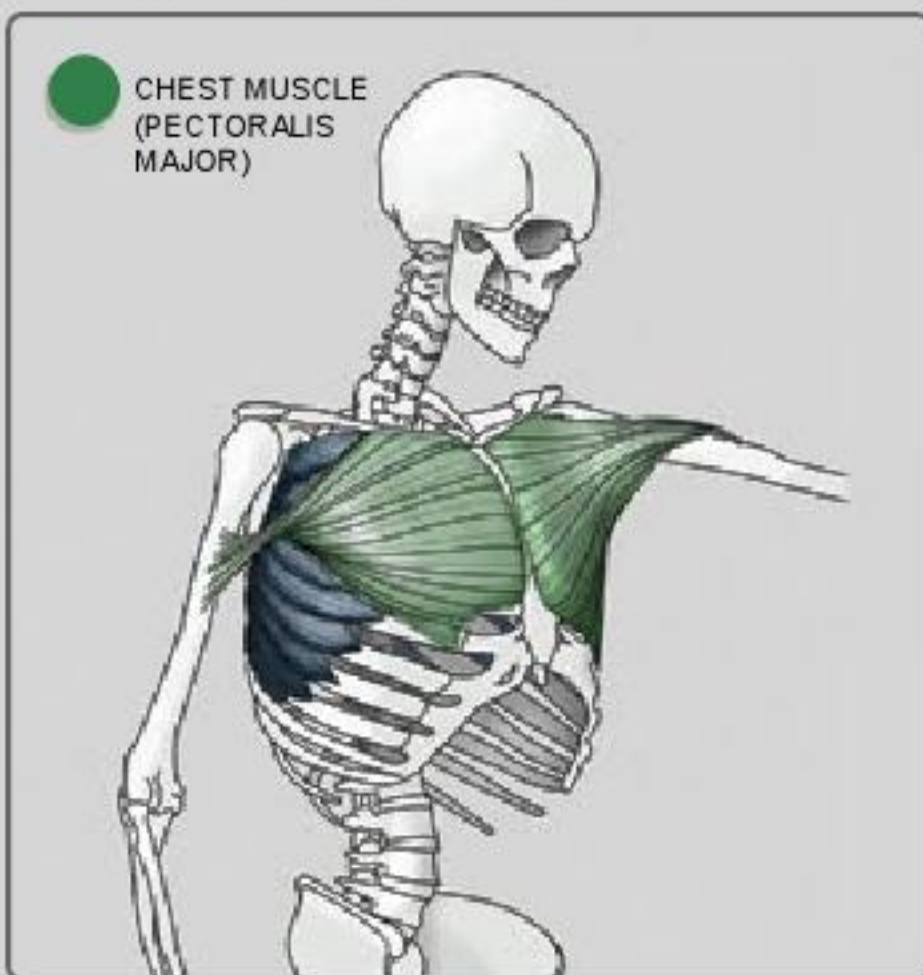
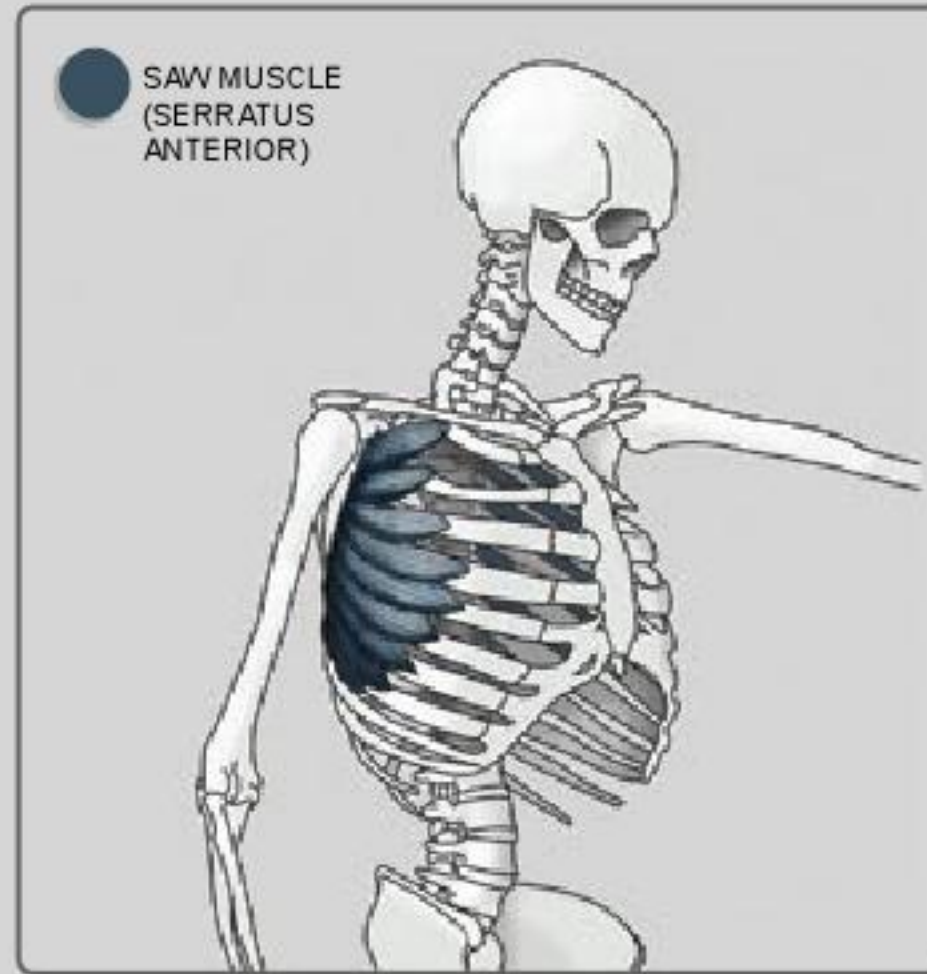
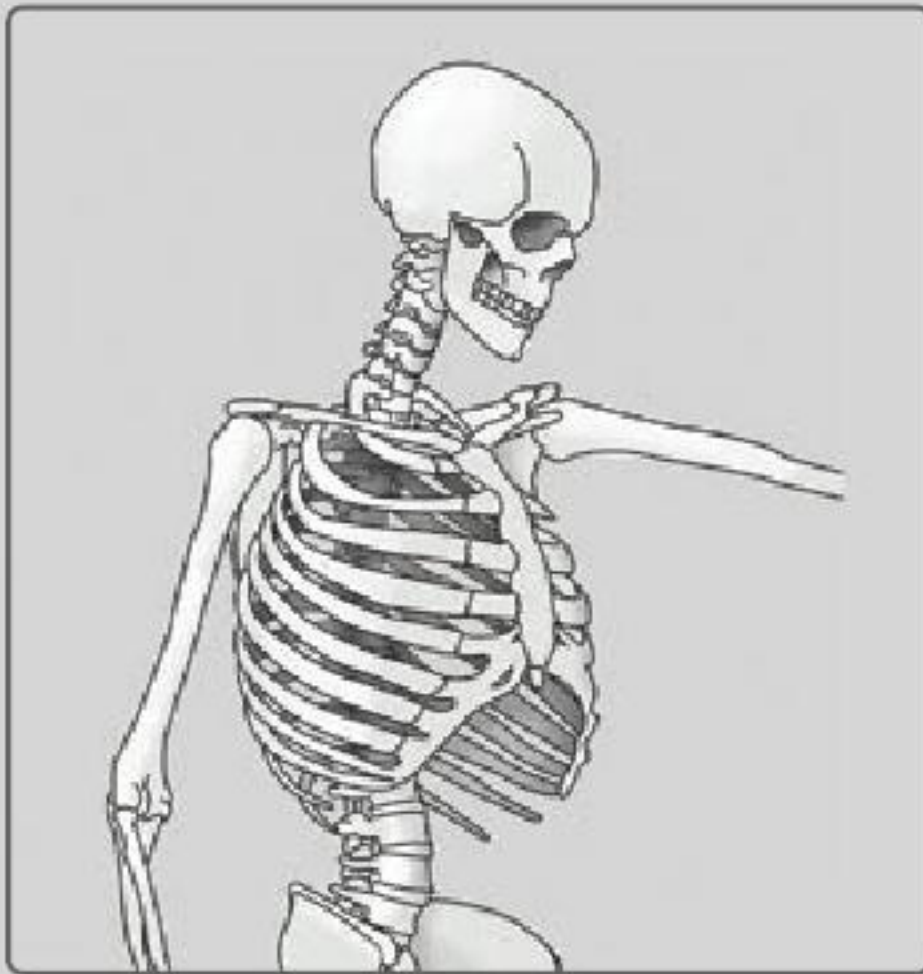


SKINLESS



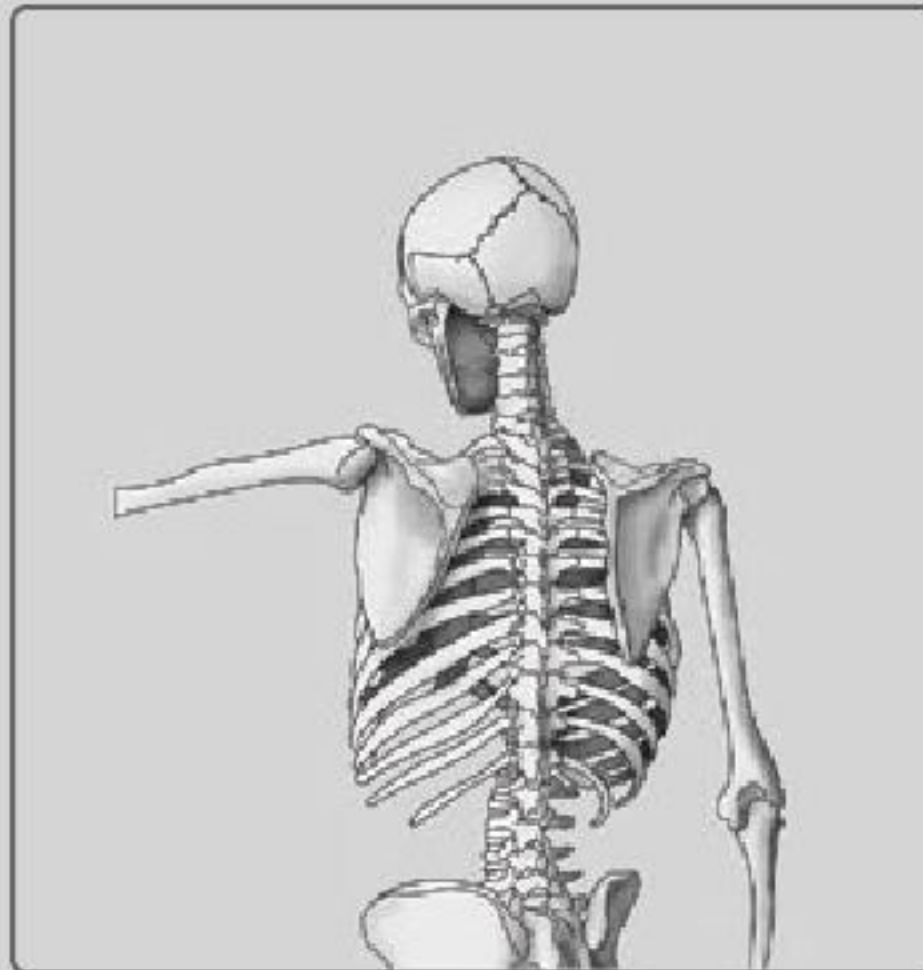


## MOST IMPORTANT MUSCLES OF FRONTAL TORSO (LAYER BY LAYER)

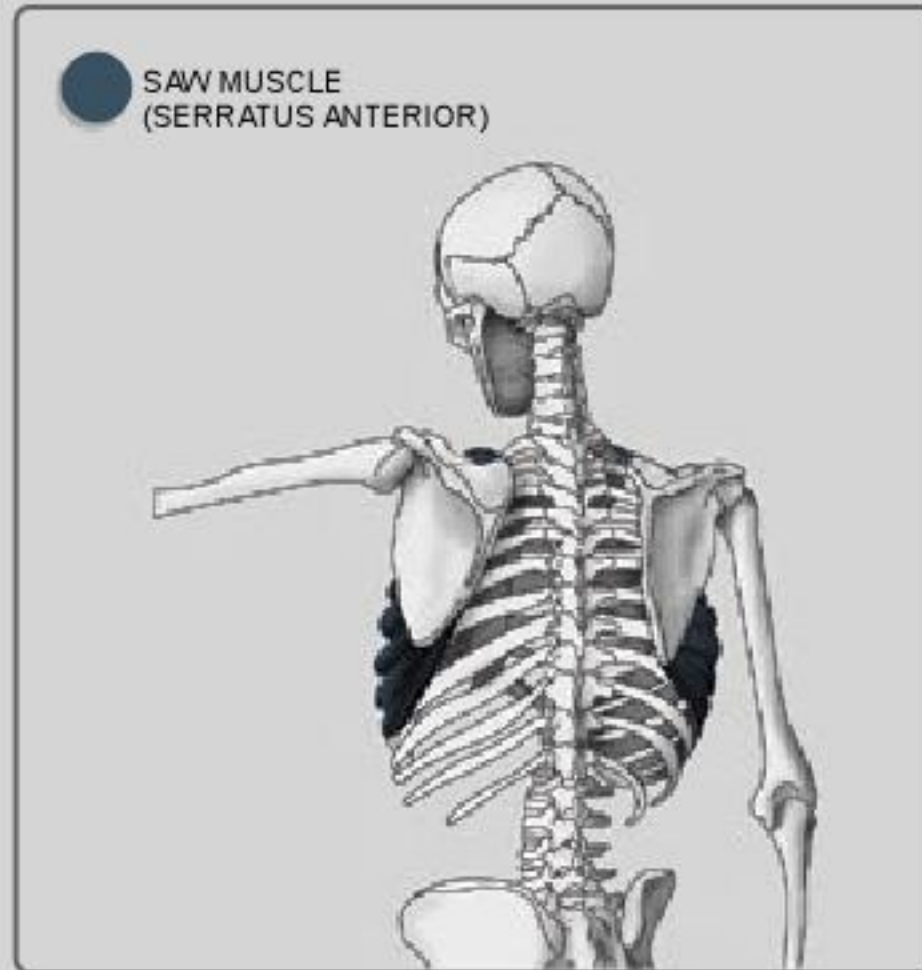




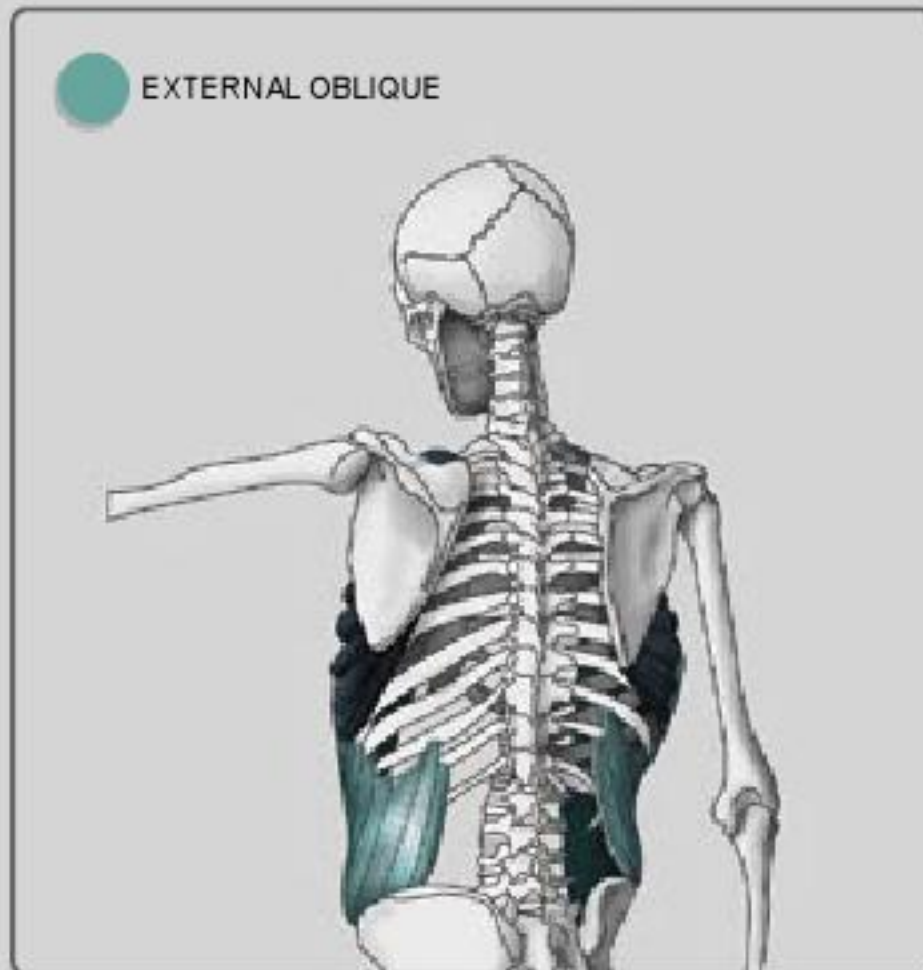
## MOST IMPORTANT BACK MUSCLES (LAYER BY LAYER)



SAW MUSCLE  
(SERRATUS ANTERIOR)

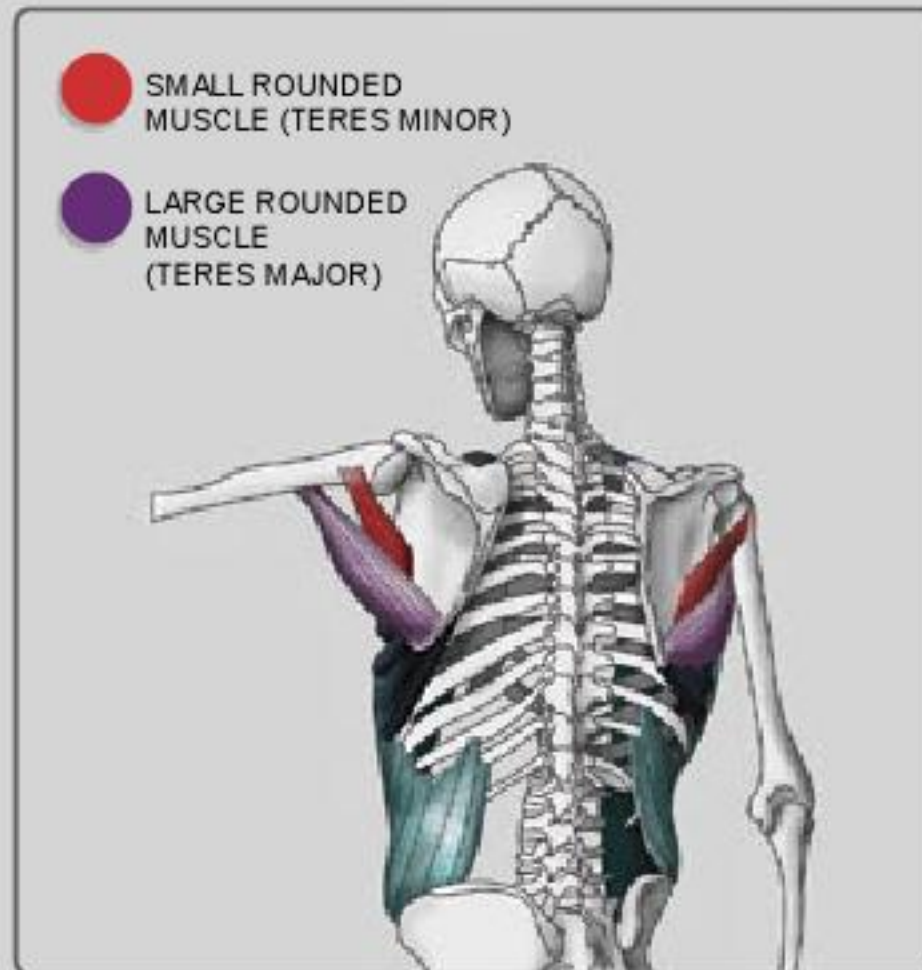


EXTERNAL OBLIQUE

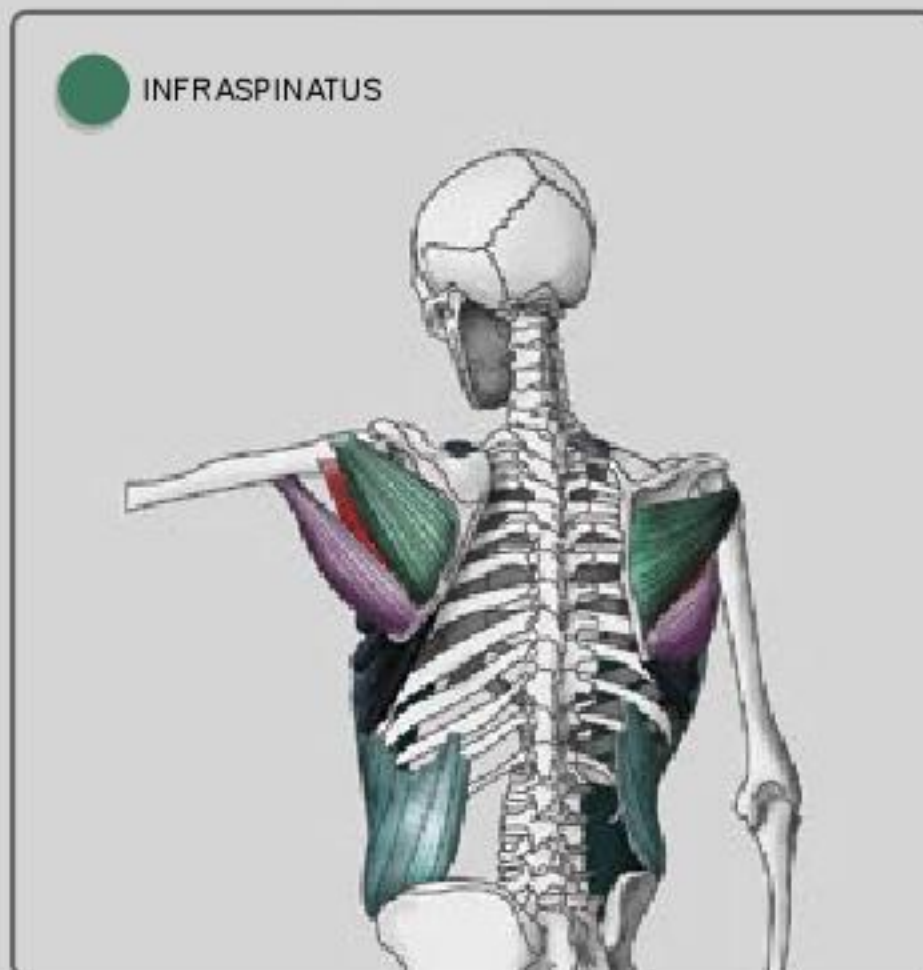


SMALL ROUNDED  
MUSCLE (TERES MINOR)

LARGE ROUNDED  
MUSCLE  
(TERES MAJOR)

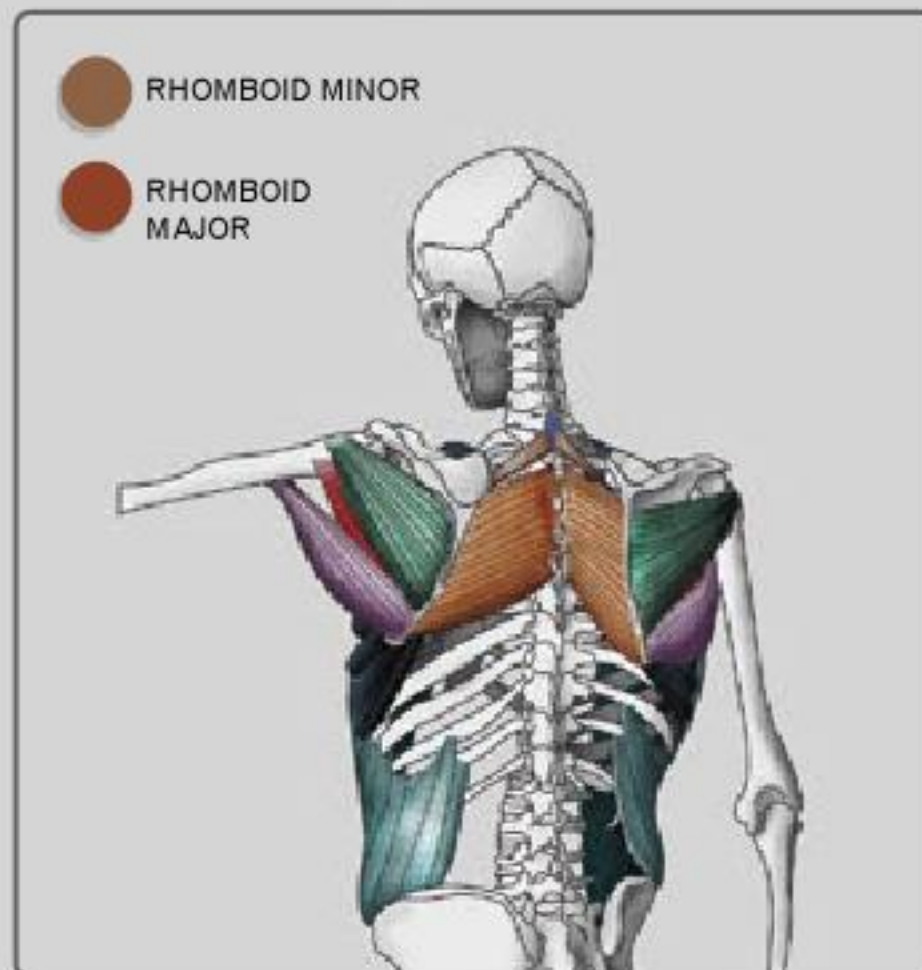


INFRASPINATUS



RHOMBOID MINOR

RHOMBOID  
MAJOR





## MOST IMPORTANT BACK MUSCLES

(LAYER BY LAYER)



**BROADEST  
BACK MUSCLE  
(LATISSIMUS DORSI)**



**TRAPEZIUS**



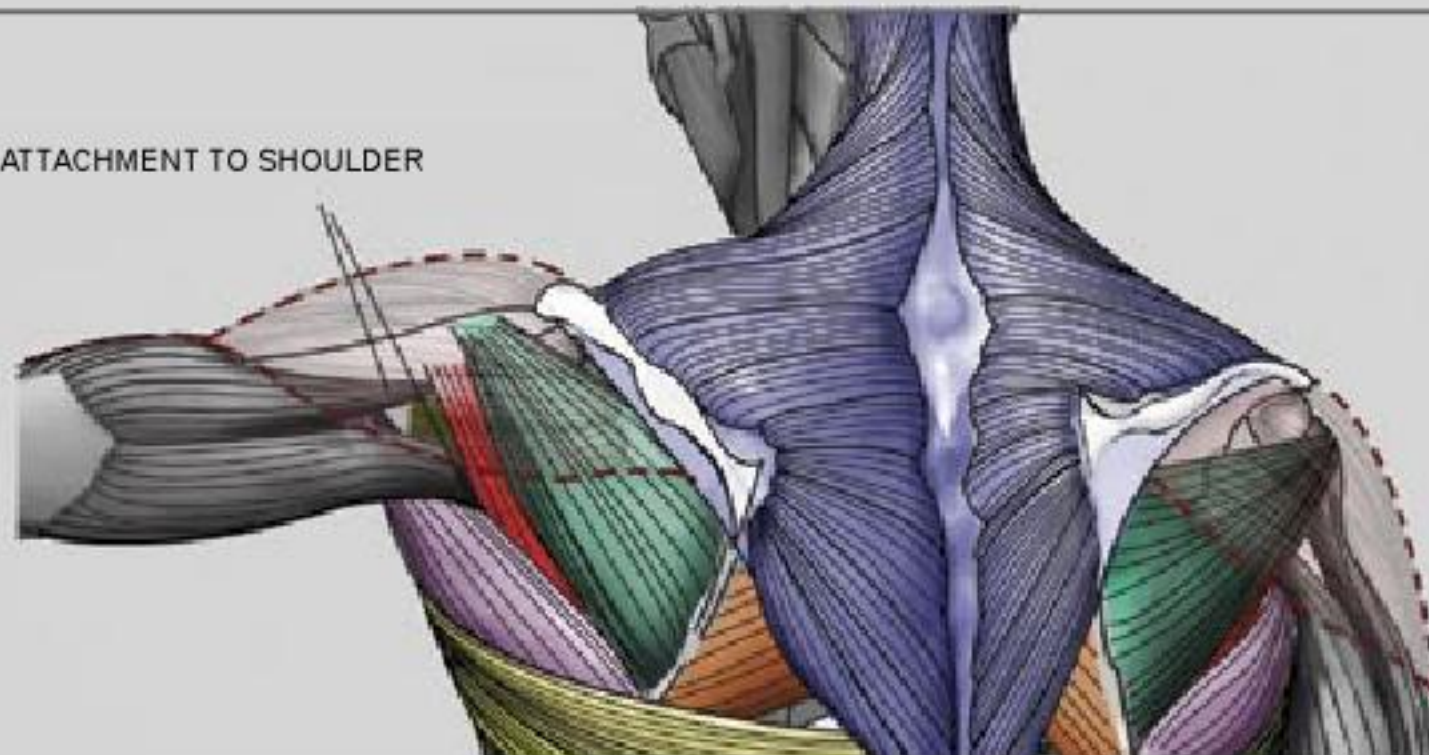
**DELTOID**



**BUTTOCKS  
(GLUTEUS MAXIMUS)**



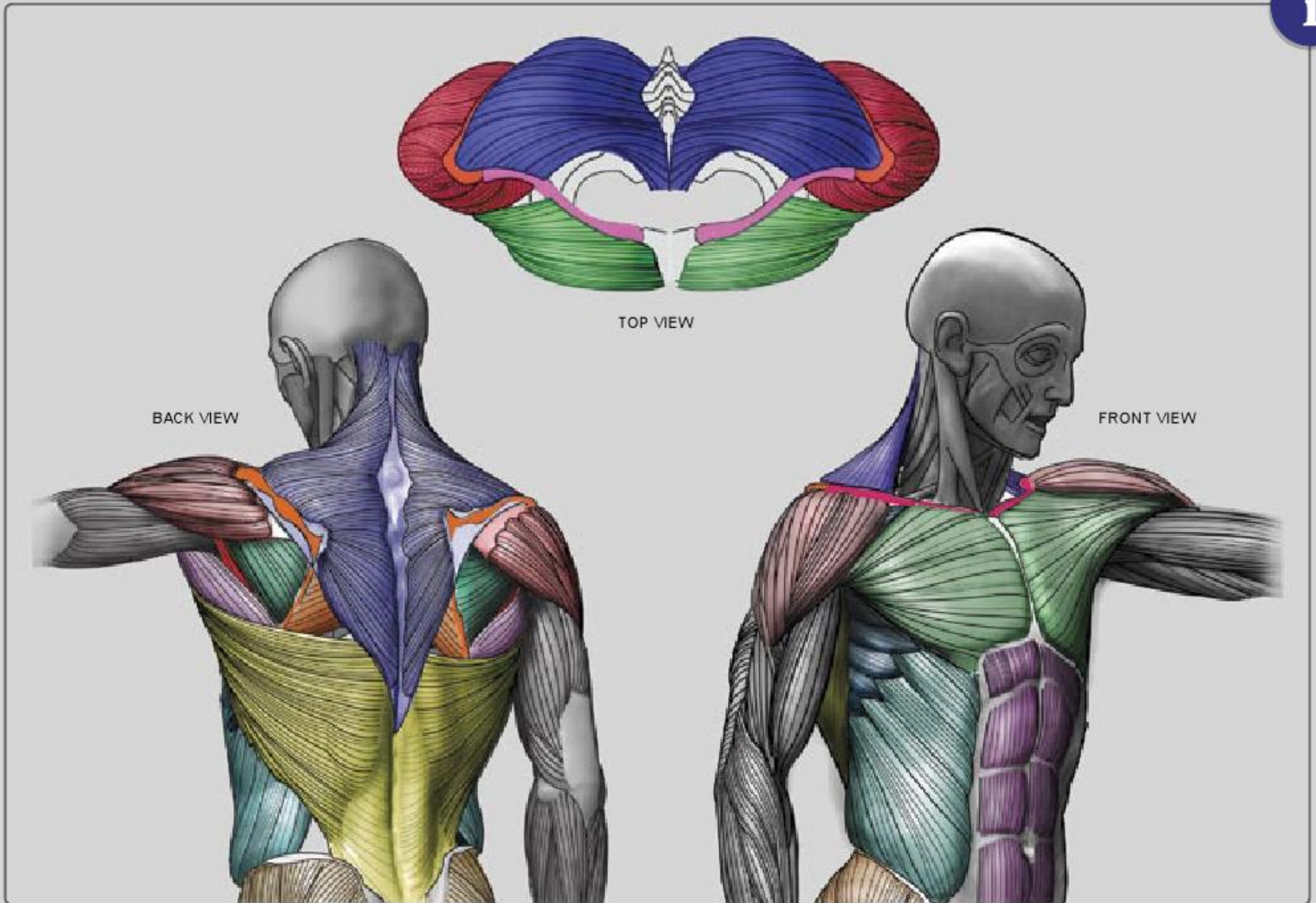
**TRICEPS ATTACHMENT TO SHOULDER**



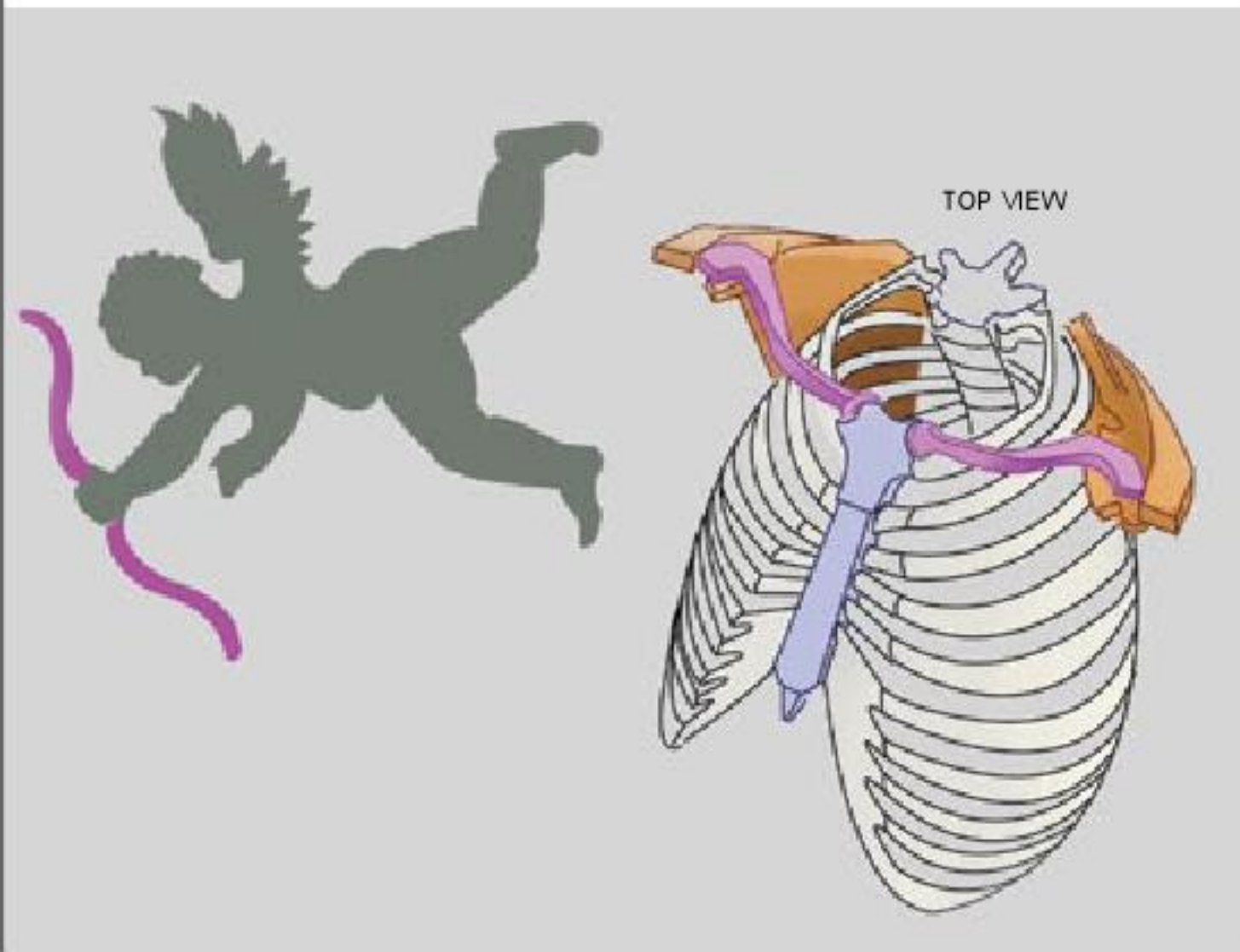


## CLAVICLE – SHAPE AND CONNECTIONS

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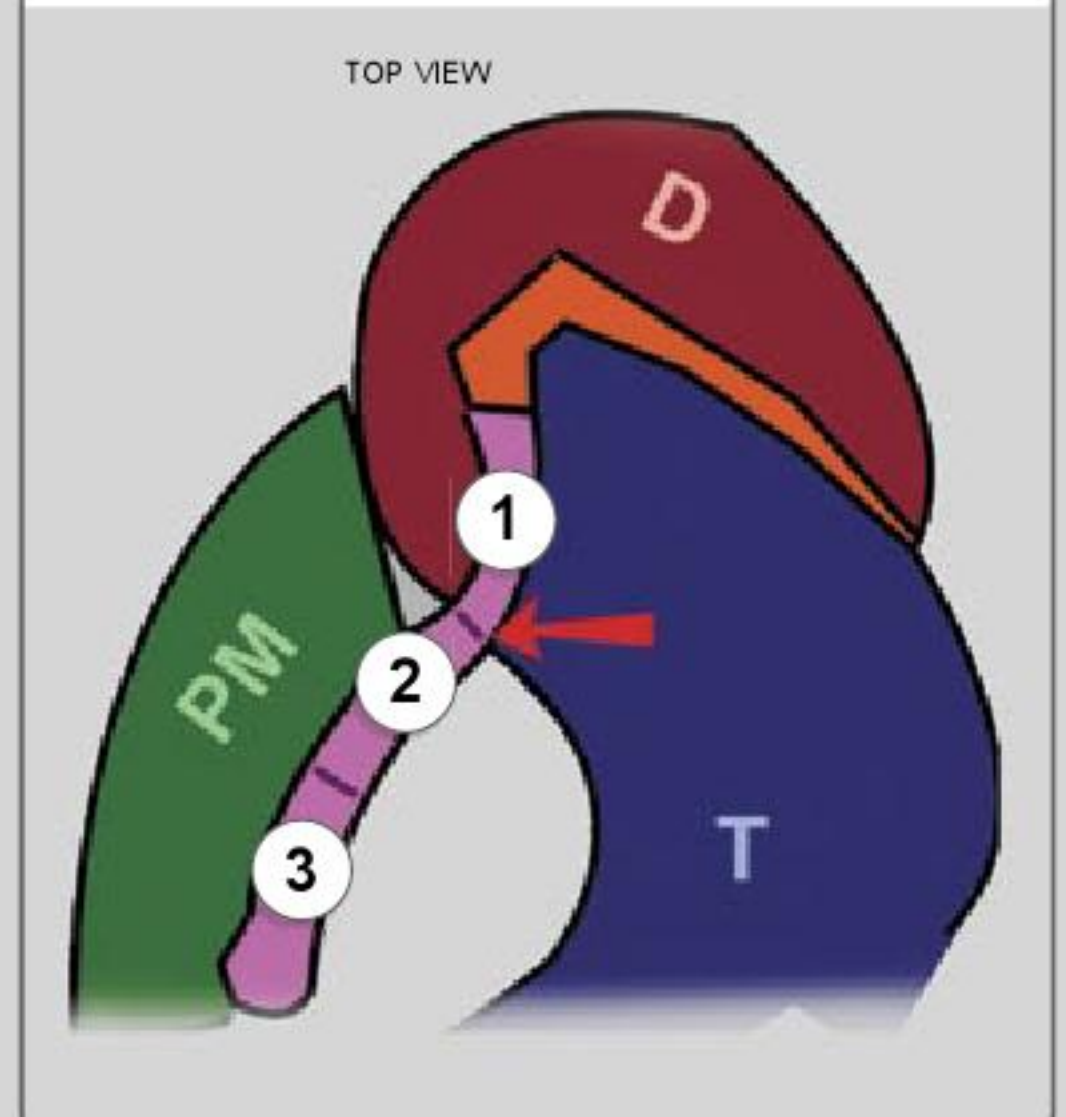


IF YOU LOOK AT THE **CLAVICLE** FROM ABOVE, YOU CAN SEE IT'S AN "S" SHAPE.



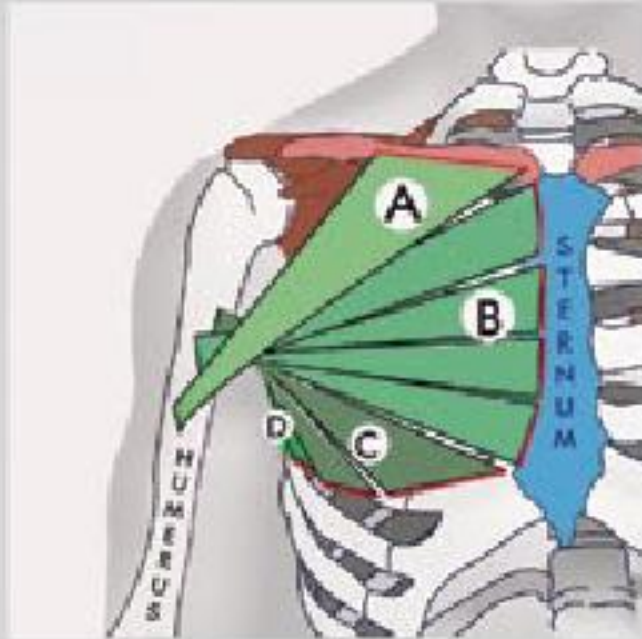
i

BOTH, **(D)** AND **(T)** CONNECT ON THE LATERAL THIRD OF THE **CLAVICLE**.





## GREAT CHEST MUSCLE (PECTORALIS MAJOR)



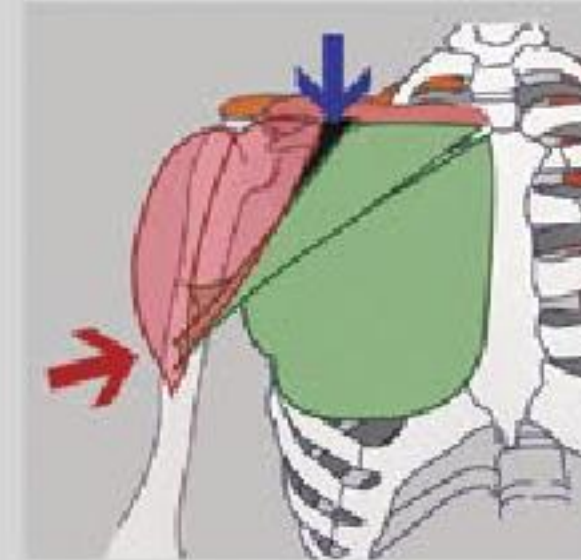
ONE END OF **PM** IS CONNECTED TO THE HUMERUS AND OTHER END CONNECTS:

- A:** TO 3/5 OF **CLAVICLE**
- B:** TO **STERNUM** BONE
- C:** TO **RIBS**
- D:** LYING ON ABDOMINAL MUSCLES

**A: THIS PORTION IS OFTEN VISIBLE AS SEPARATE PART OF **PM**.**

i

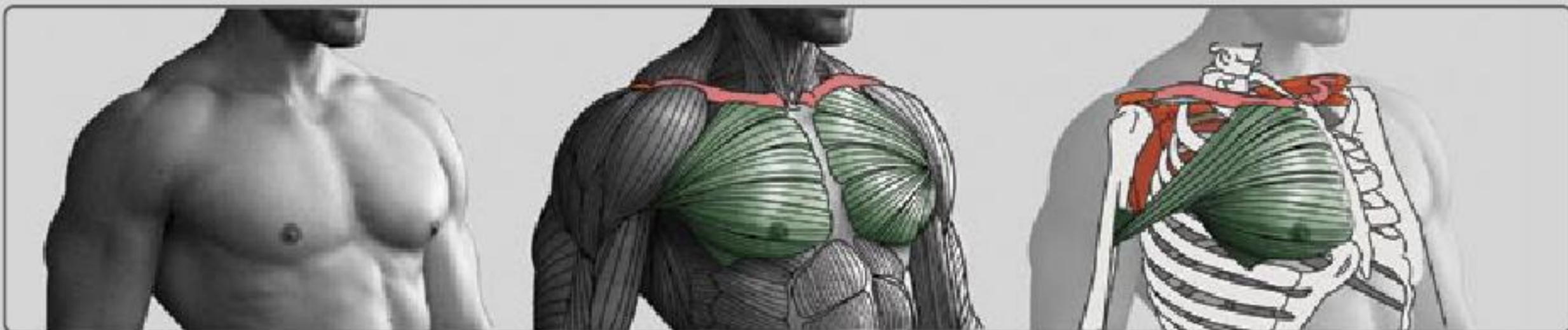
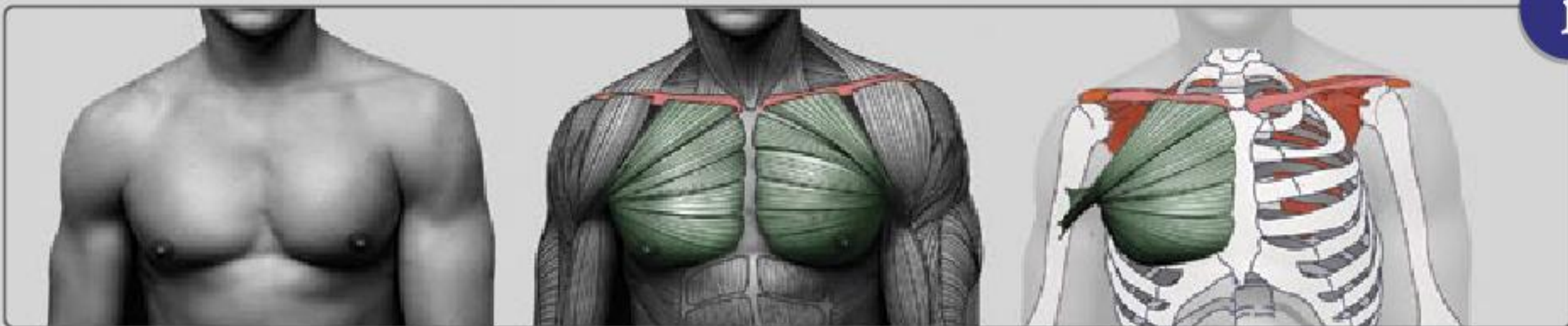
**HOLLOW AREA BETWEEN **PM** AND **DELTOID** IS ALWAYS VISIBLE!**



****PM** IS PARTIALLY COVERED BY **DELTOID** MUSCLE.**

i

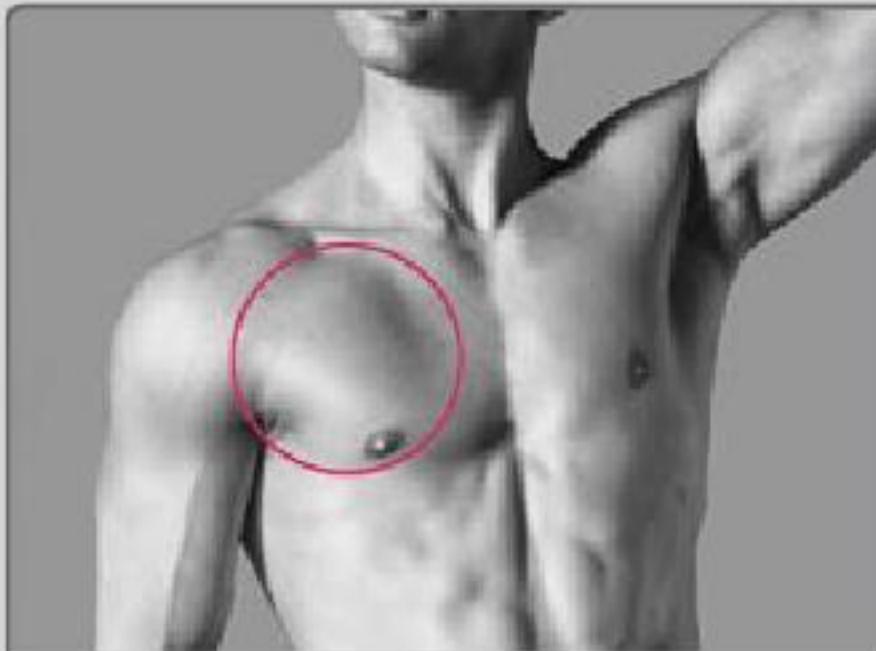
i



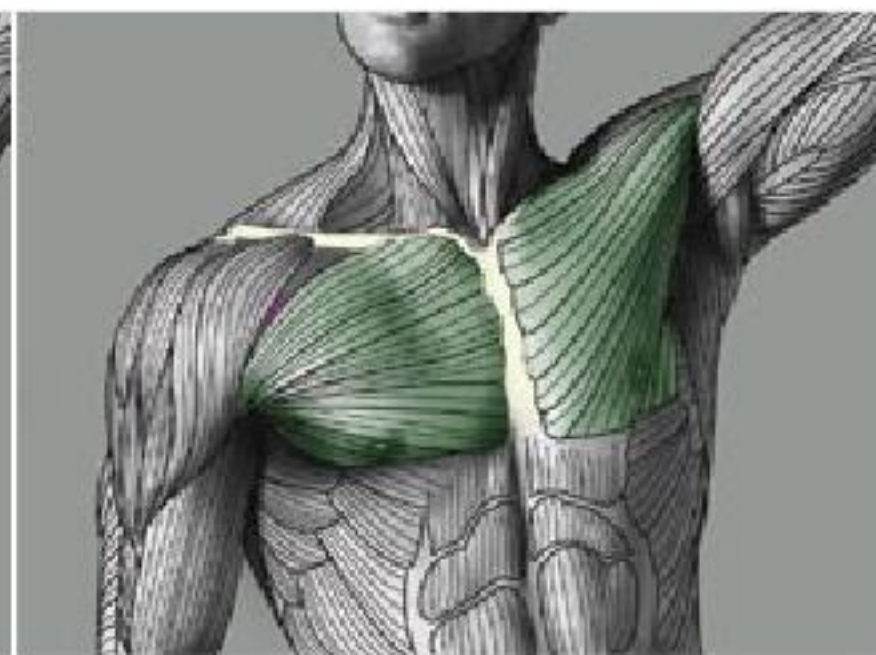
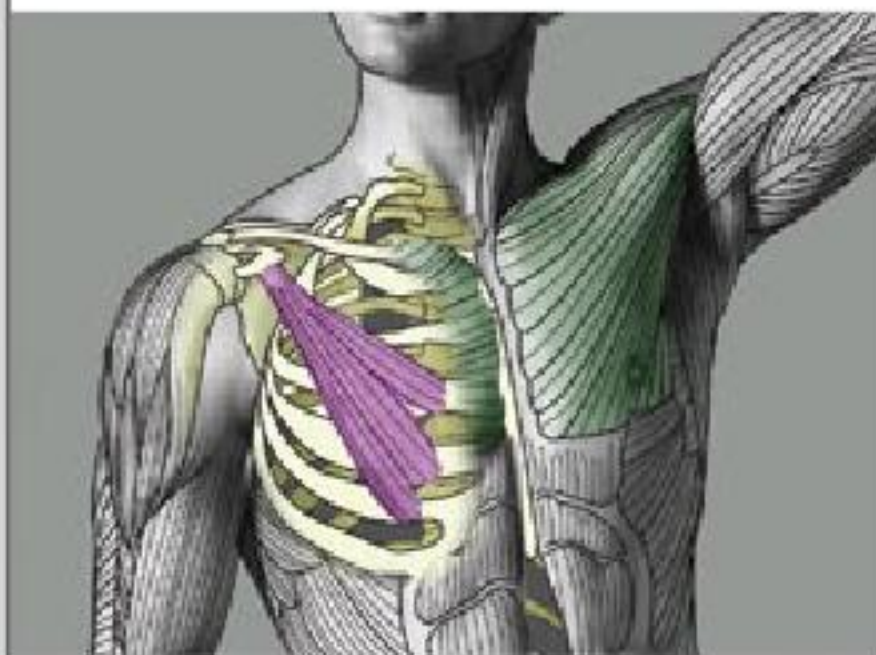


## WHAT IS THIS BULGE?

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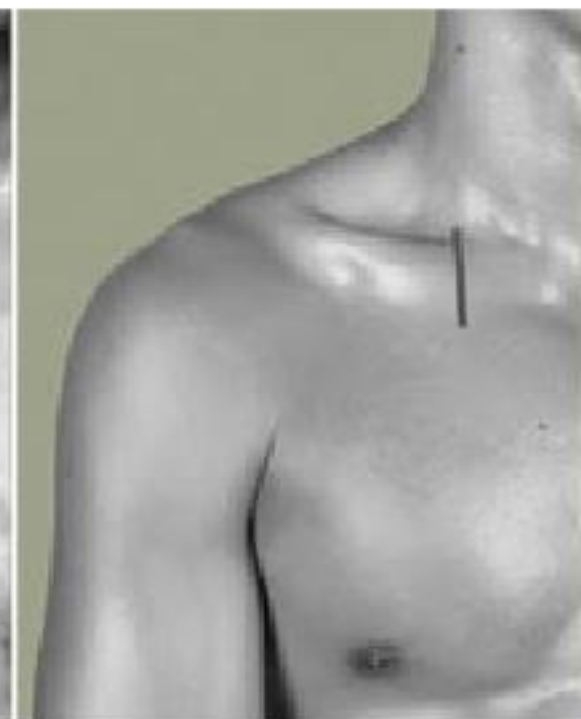
THE **PECTORALIS MINOR** MUSCLE PUSHING **PECTORALIS MAJOR** OUTWARD FROM UNDERNEATH.



**ORIGIN:** STERNUM ENDS AT 3-5 RIBS  
**INSERTION:** CORACOID PROCESS OF SCAPULA  
**ACTION:** MOVES SHOULDER BLADE FORWARD AND DOWNWARD



AS **CHEST MUSCLES** BECOME MORE DEVELOPED, LESS **COLLAR BONE (CLAVICLE)** IS VISIBLE.

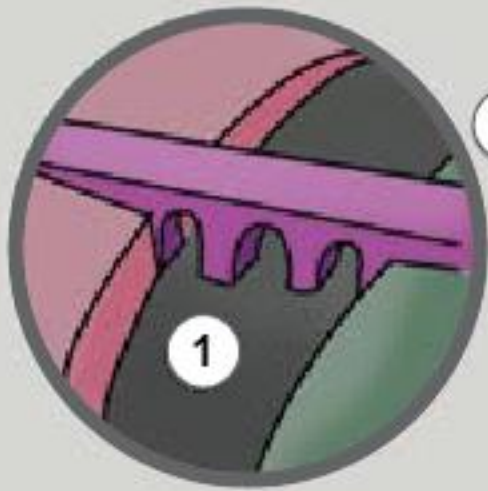
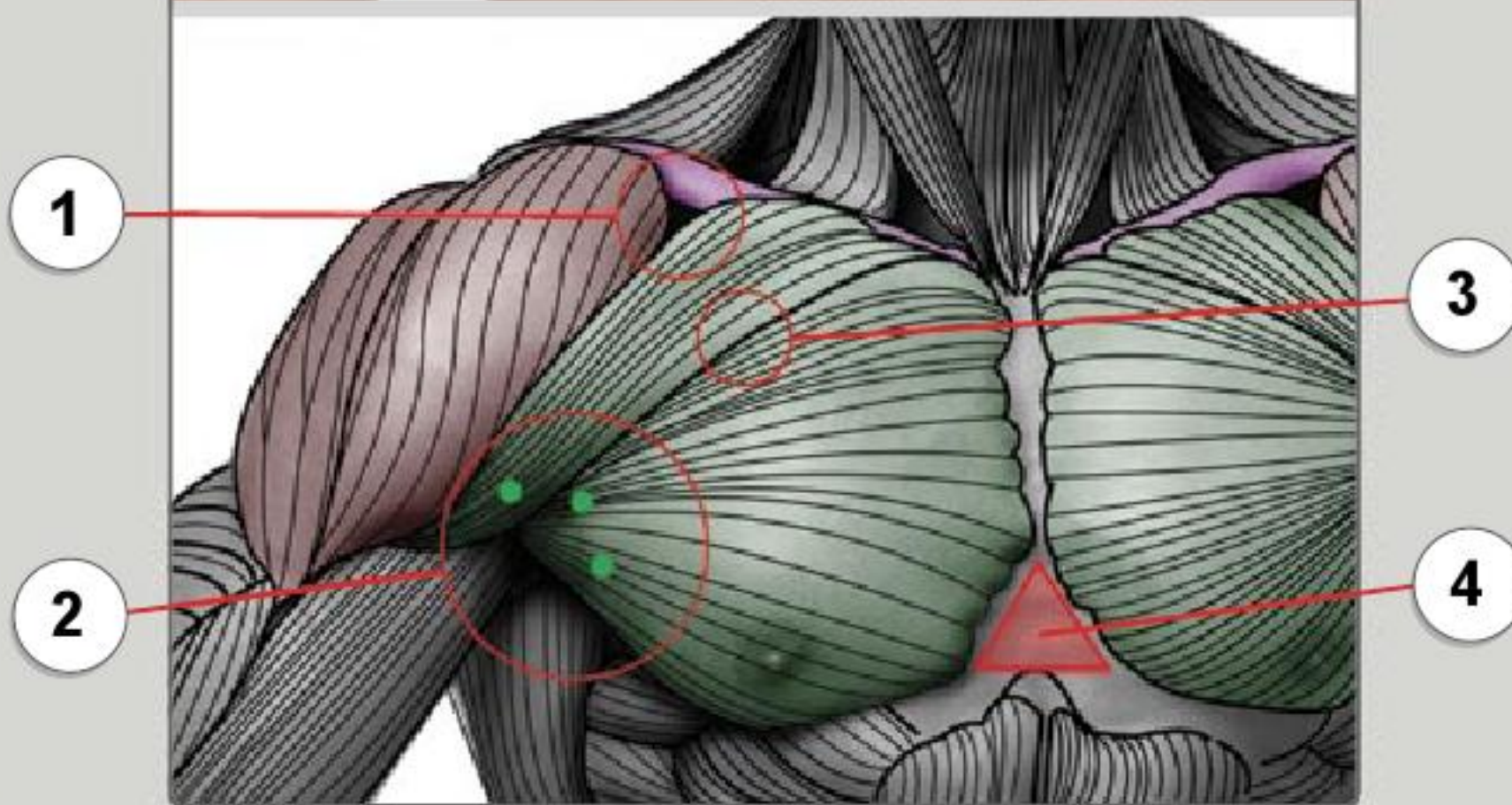


CROSS SECTION OF **COLLAR BONE (CLAVICLE)** AND **CHEST MUSCLE (PECTORALIS MAJOR)**.





## CHEST AND SHOULDER FEATURES



1 **CLAVARBONE (CLAVICLE)** IS LIKE A BRIDGE OVER A VALLEY. UNDERNEATH THE CLAVARBONE IS THE **INFRACLAVICULAR TRIANGLE (INFRACLAVICULAR FOSSA)**, WHICH IS A PIT BETWEEN **THE CHEST MUSCLE (PECTORALIS MAJOR)** AND **SHOULDER MUSCLE (DELTOID)**. THE **CLAVARBONE (CLAVICLE)** IS ALWAYS VISIBLE.

2 EACH BODY  OF **THE CHEST MUSCLE (PECTORALIS MAJOR)** HAS DIFFERENT INSERTIONS ON **THE HUMERUS**. FIBERS CHANGE DIRECTIONS, CROSSING OVER EACH OTHER AND CREATING **MULTIPLE MASSES ON THE EDGE OF THE ARMPIT**.

3 SOMETIMES IN VERY MUSCULAR INDIVIDUALS, YOU CAN SEE A SEPARATION BETWEEN THE **CLAVICULAR SECTION** AND **STERNAL SECTION** OF THE **CHEST MUSCLE (PECTORALIS MAJOR)**.

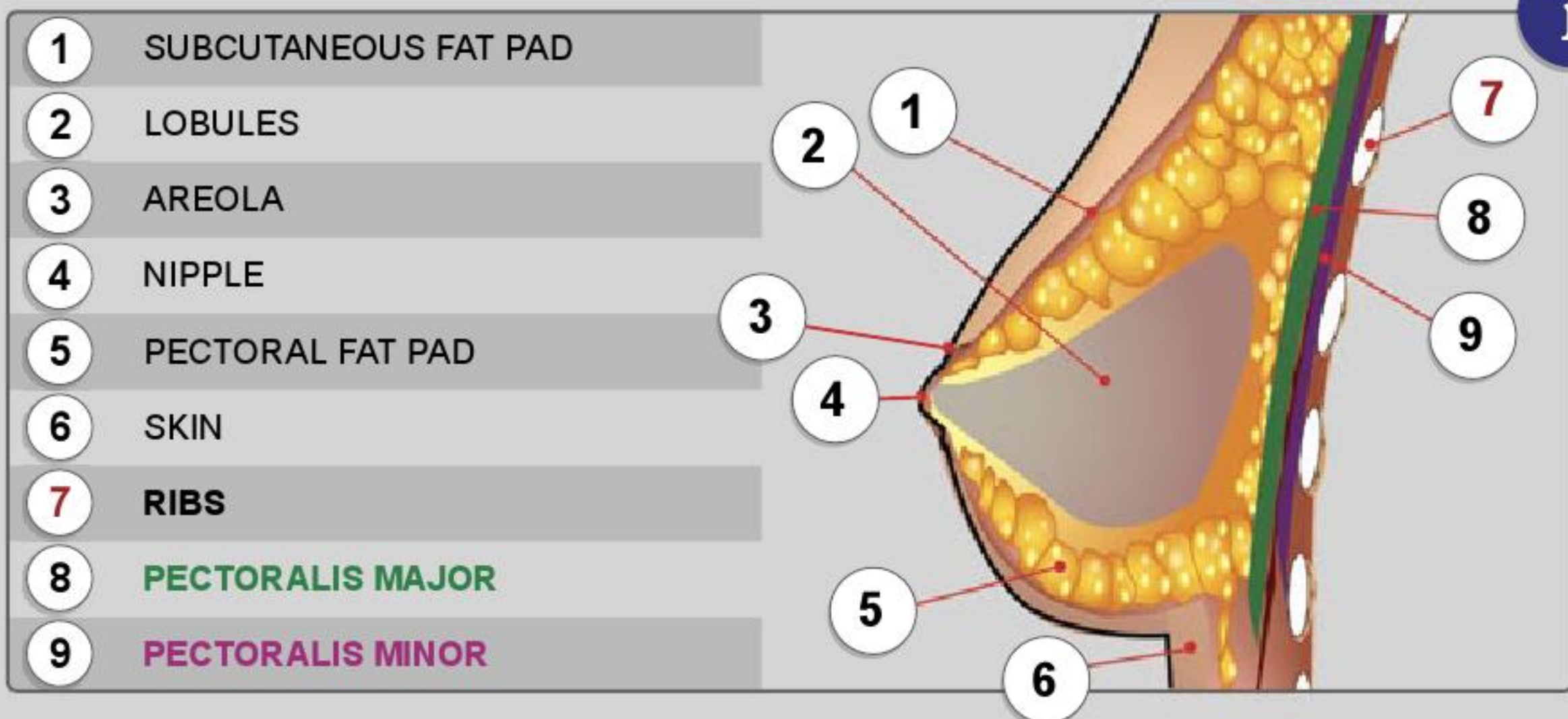
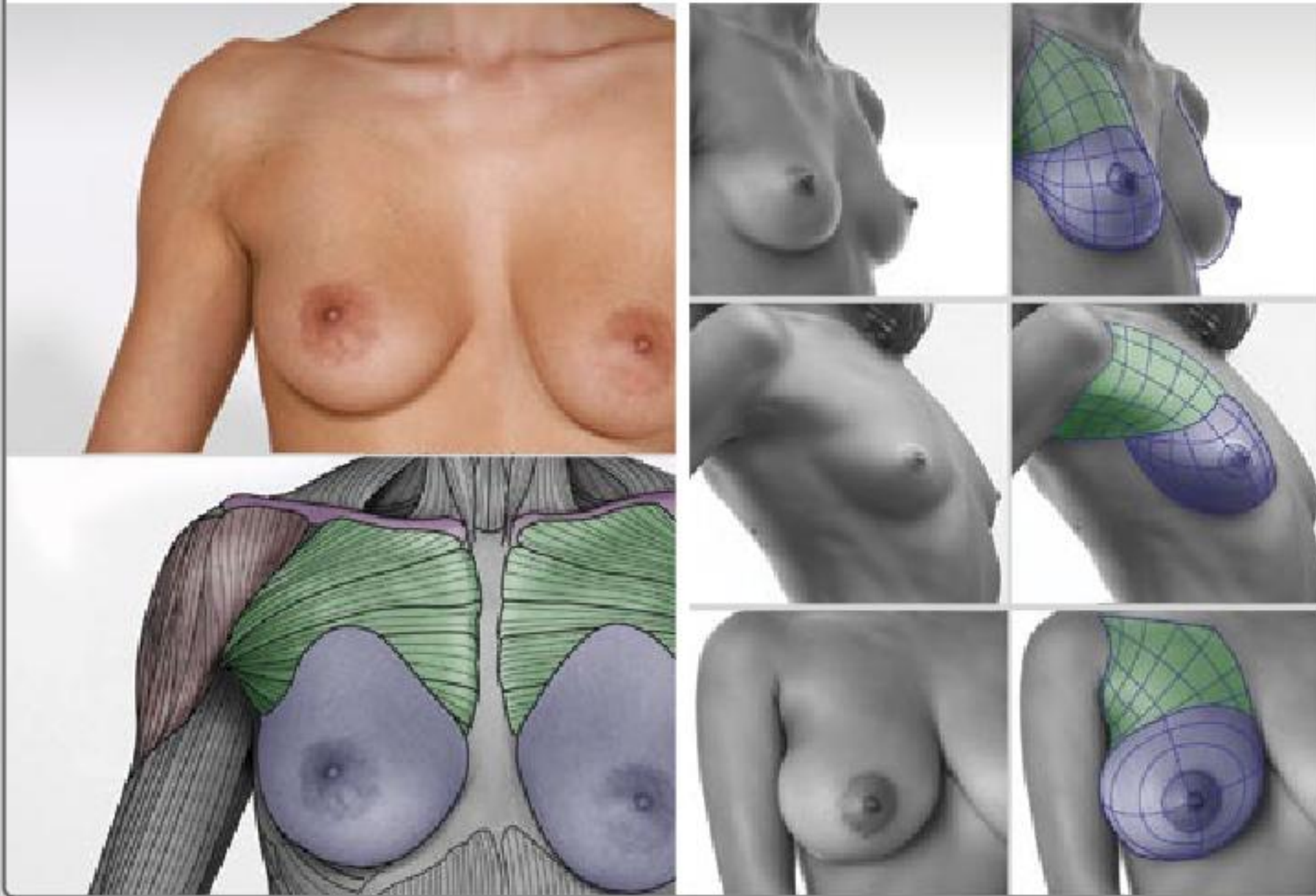
4 **BONY TRIANGLE** BETWEEN **CHEST MUSCLES** AND **ABDOMINAL SIX-PACK**.





## FEMALE BREAST

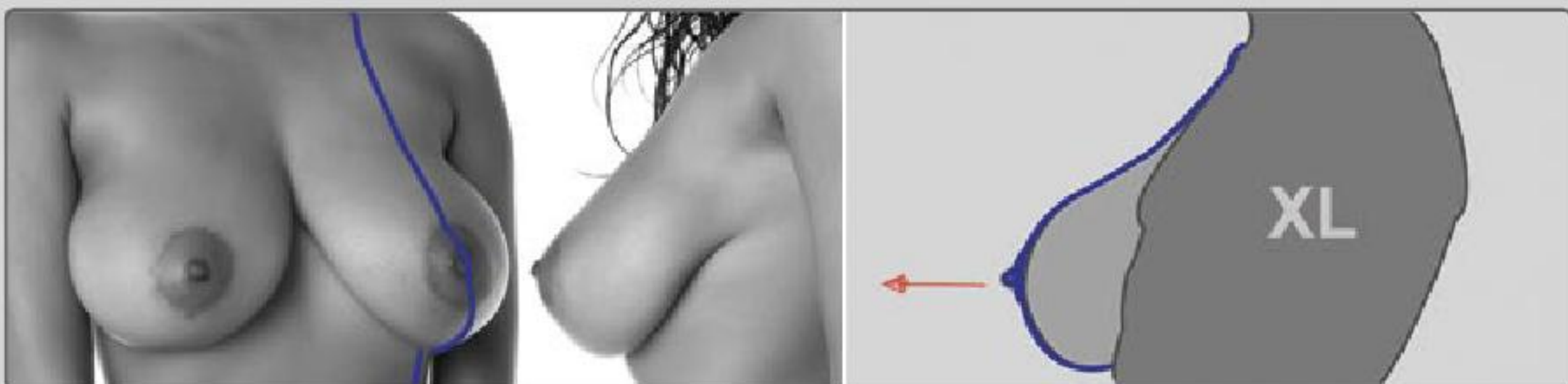
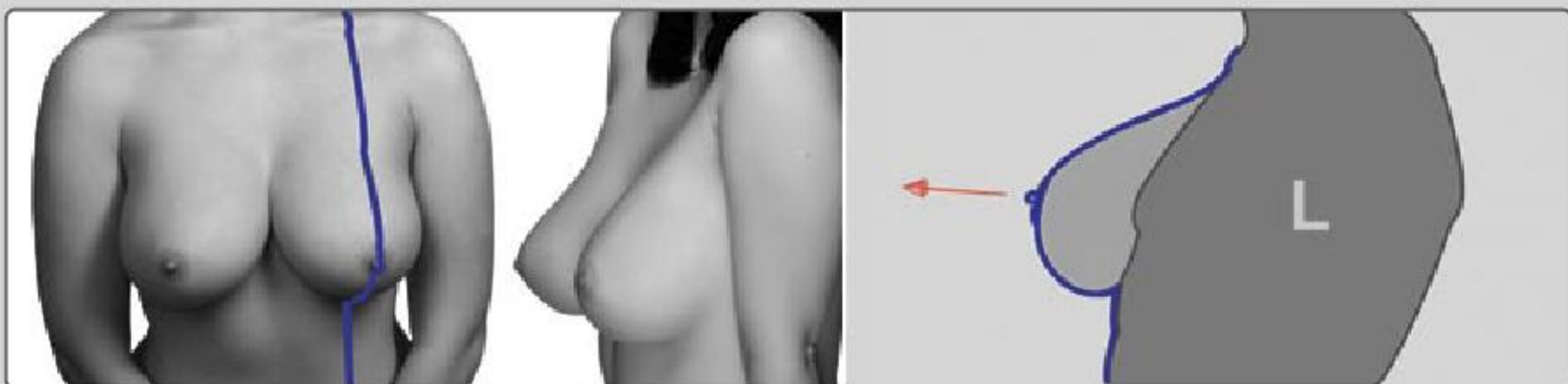
IMAGINING THE SEPARATION BETWEEN **BREASTS** AND **PECTORAL MUSCLES** MAY HELP YOU SCULPT THEM CORRECTLY.





## FEMALE BREAST ANGLES VARY DEPENDING ON SHAPE AND SIZE

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## BREAST VOLUME AND POSITIONING

ALTHOUGH THE SHAPE CHANGES,  
VOLUME REMAINS CONSTANT.



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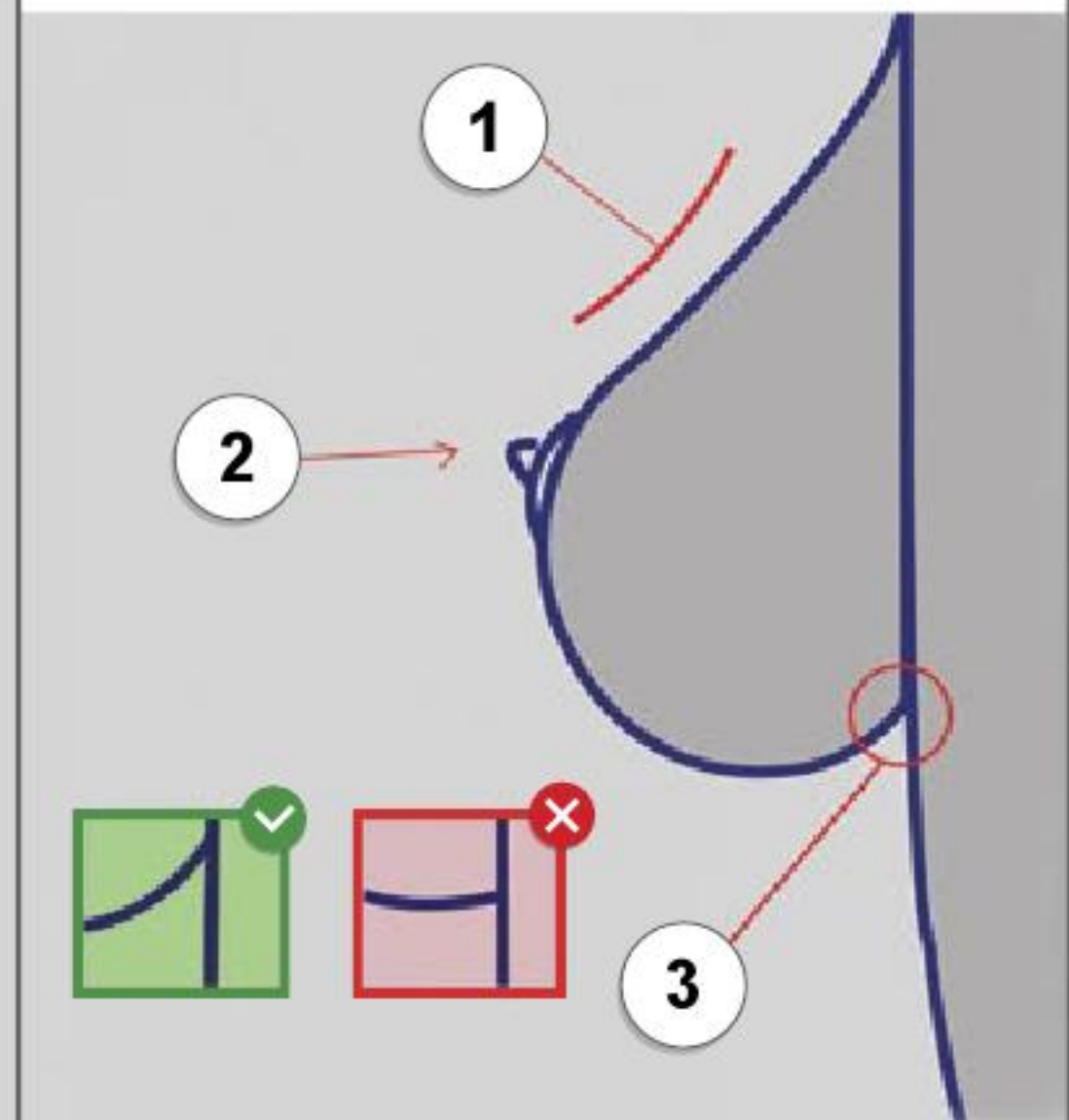


THE LARGER THE BREASTS, THE MORE  
THEY ARE SHAPED BY GRAVITY WHEN A  
WOMAN IS LYING ON HER BACK.



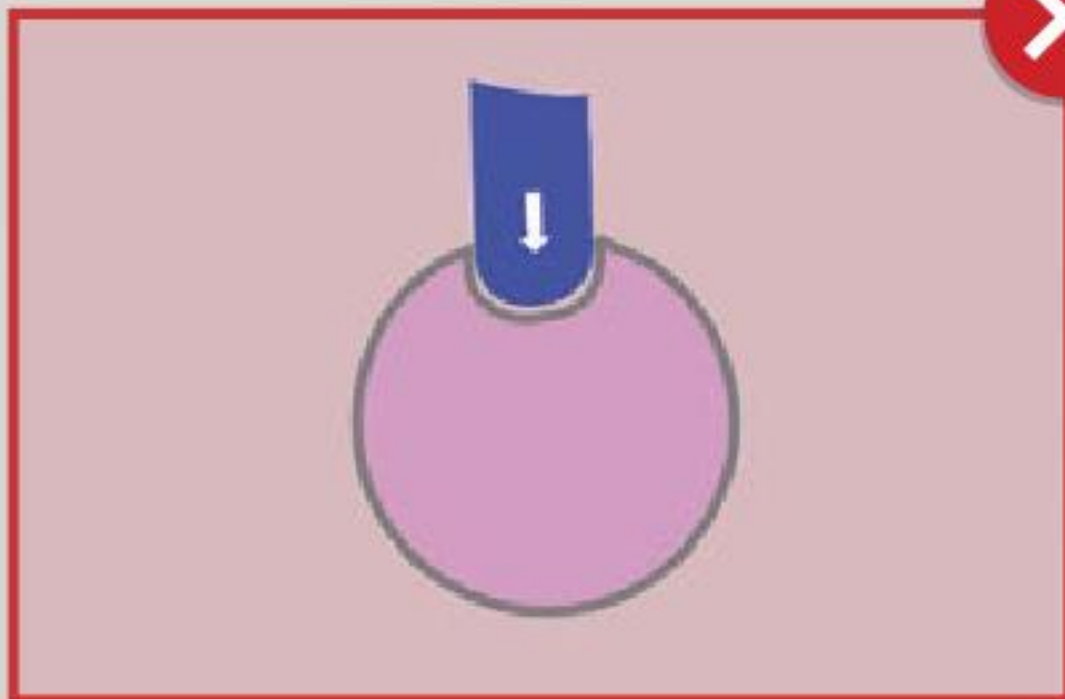
💡

3 TIPS ON HOW TO MAKE FEMALE  
BREASTS LOOK YOUTHFUL.

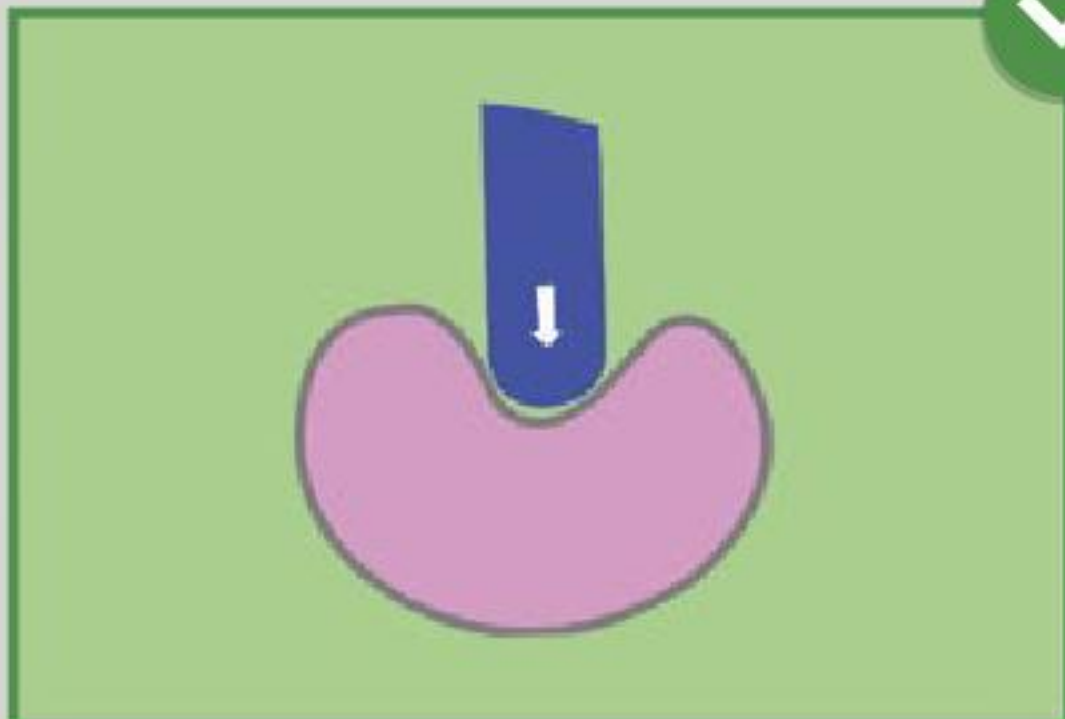


- 1 TOP SIDE: STRAIGHT OR CONCAVE, BUT NEVER CONVEX
- 2 NIPPLE POINTS UPWARD
- 3 LIFT LOWER BORDER WHERE BREAST CONNECTS TO CHEST WALL

✗

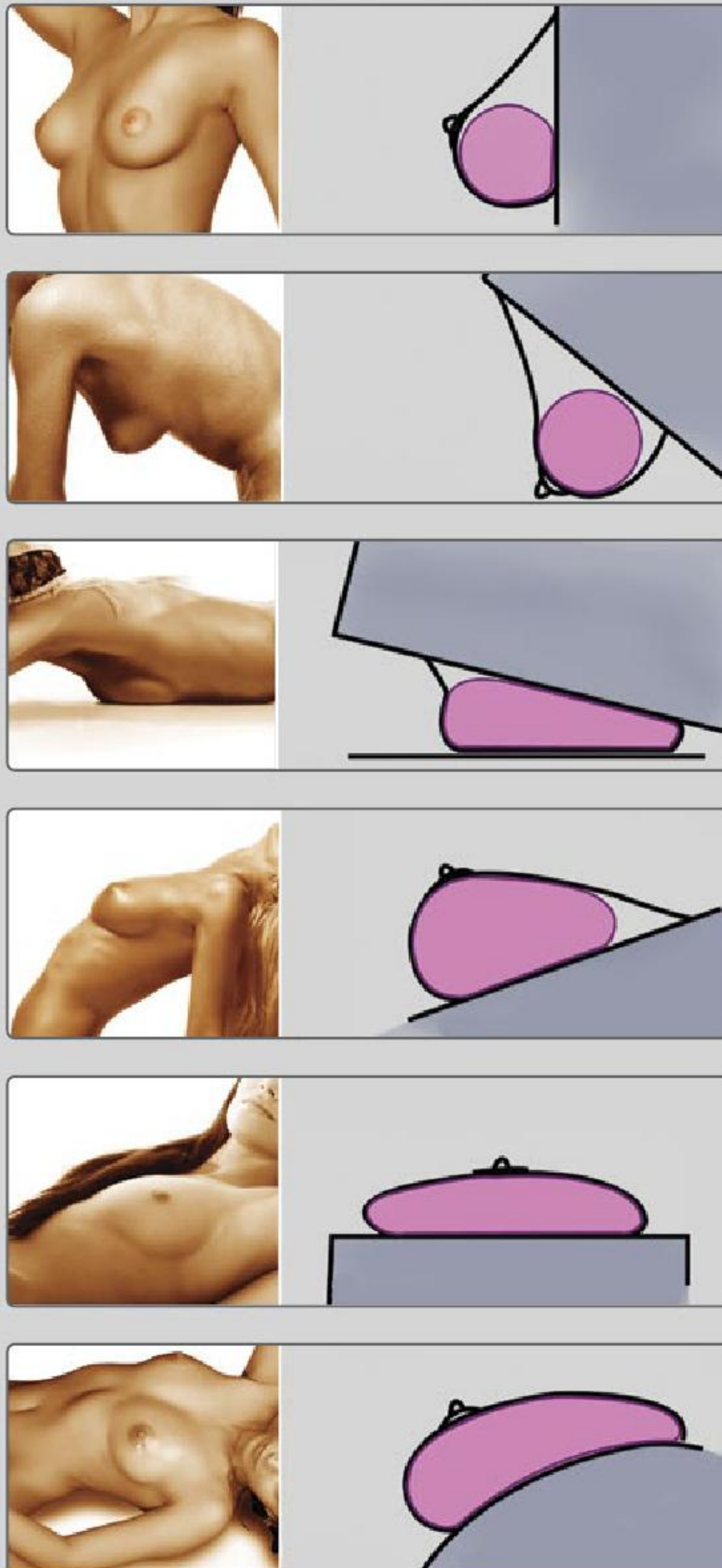


✓



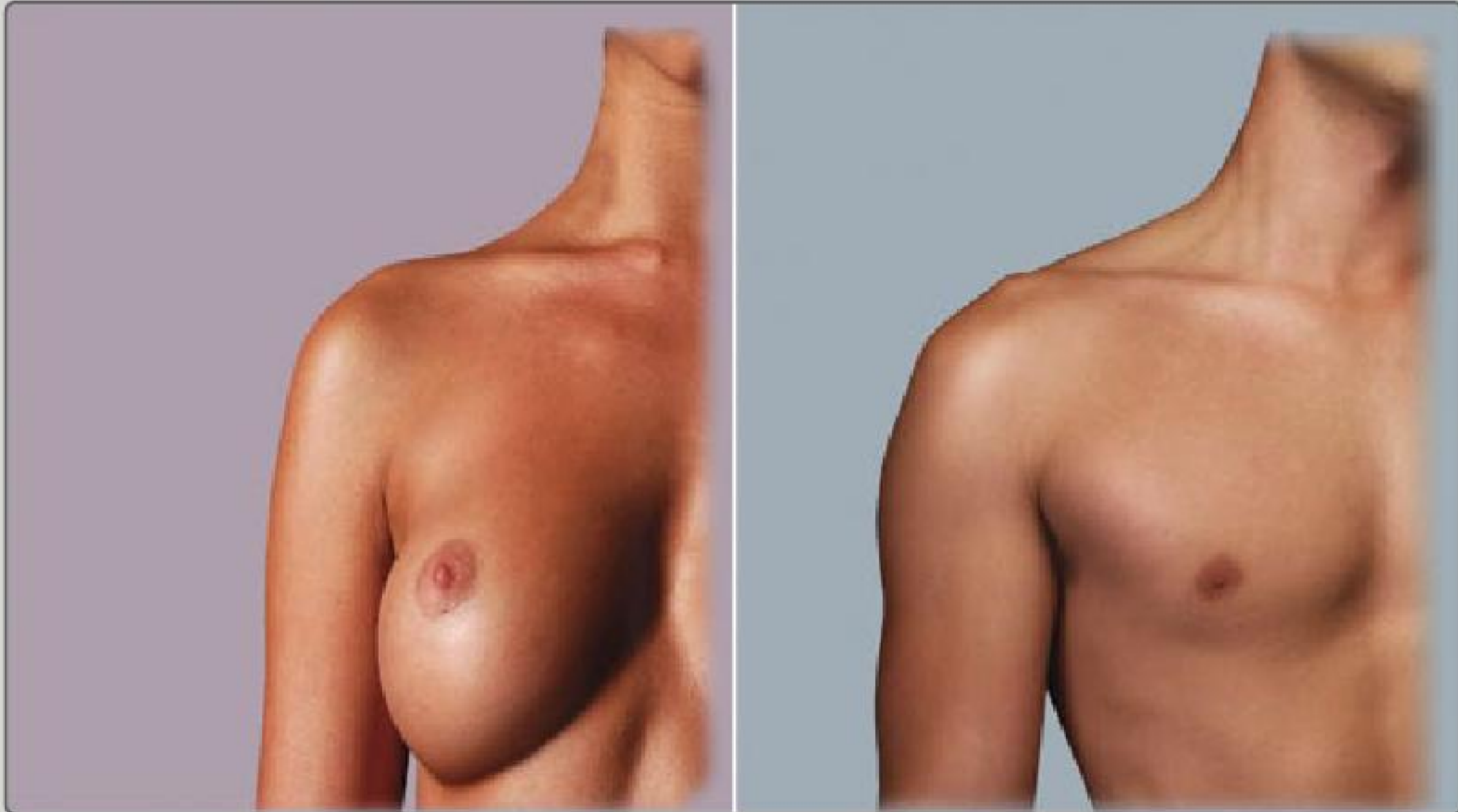


## WEIGHT AND MASS DISTRIBUTION OF FEMALE BREAST

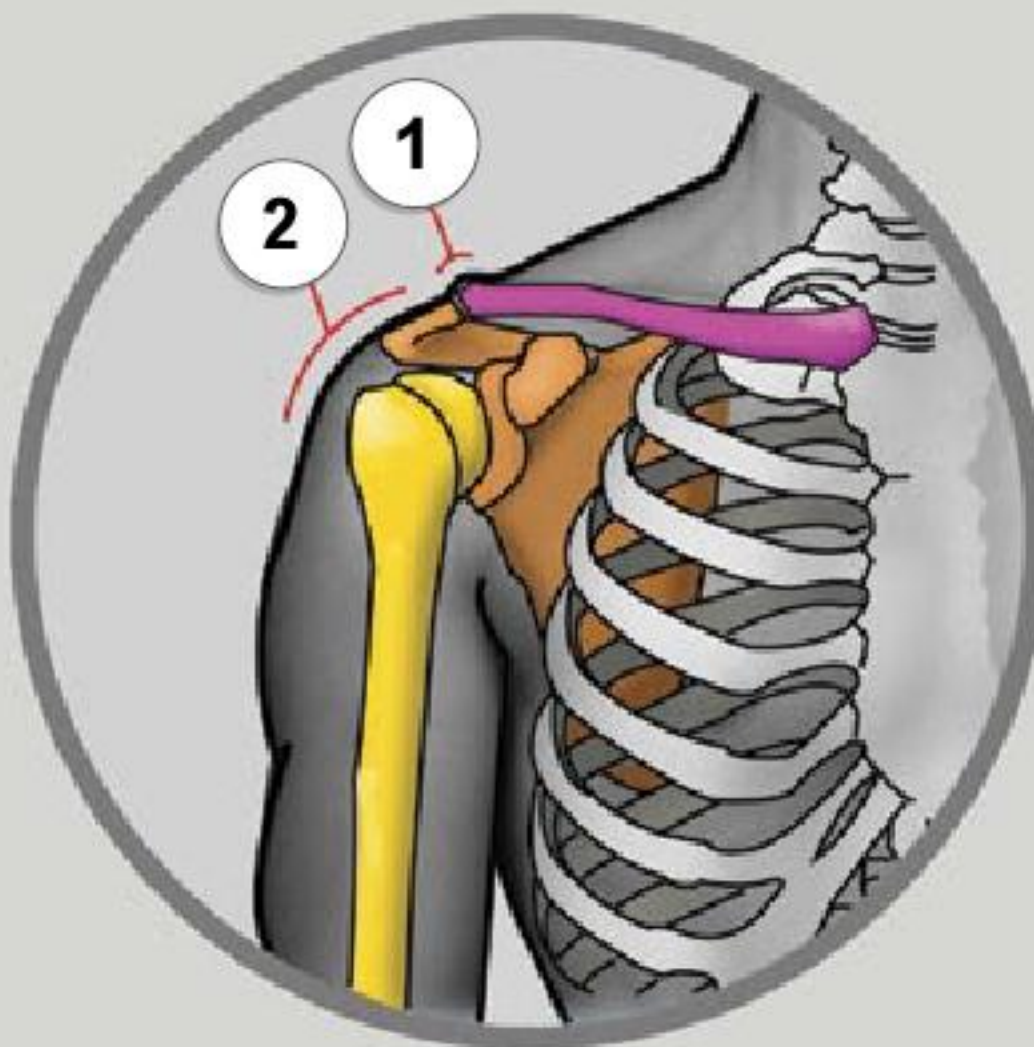




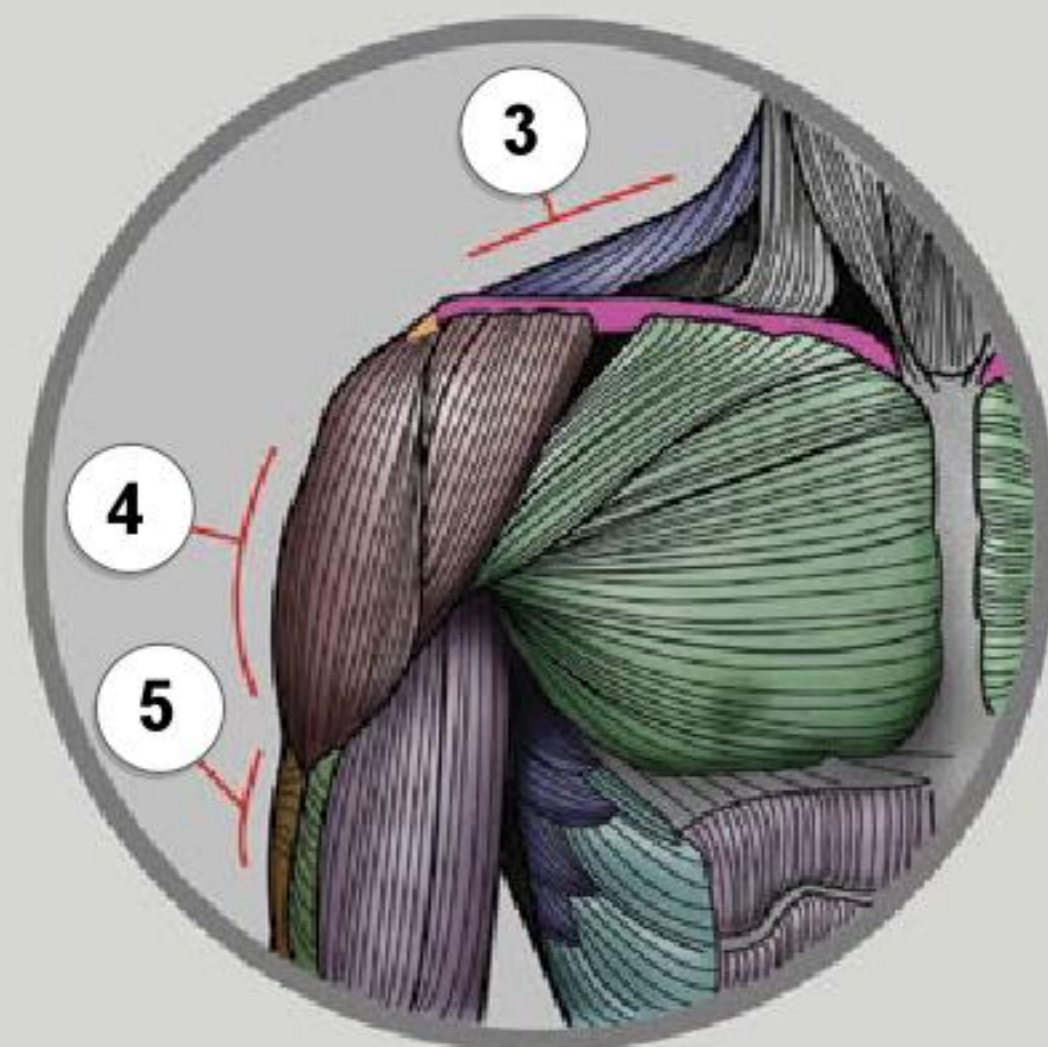
## WHAT CREATES A SHOULDER'S SILHOUETTE?



BONES



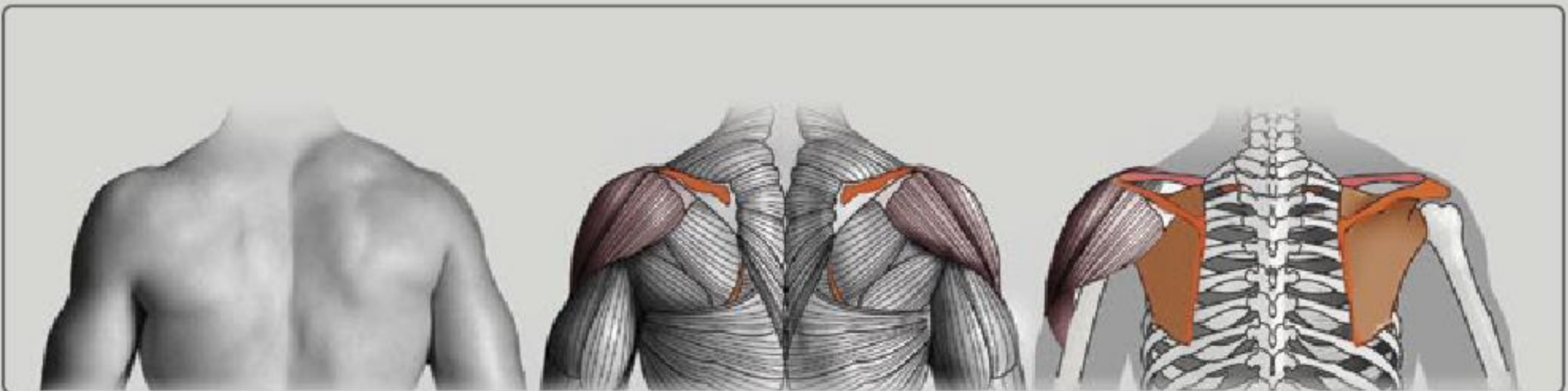
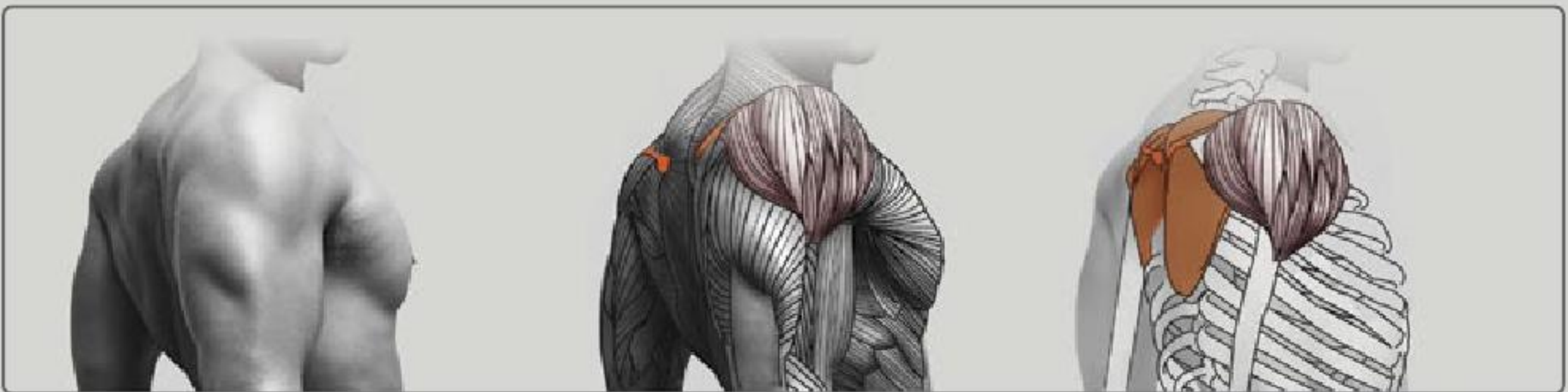
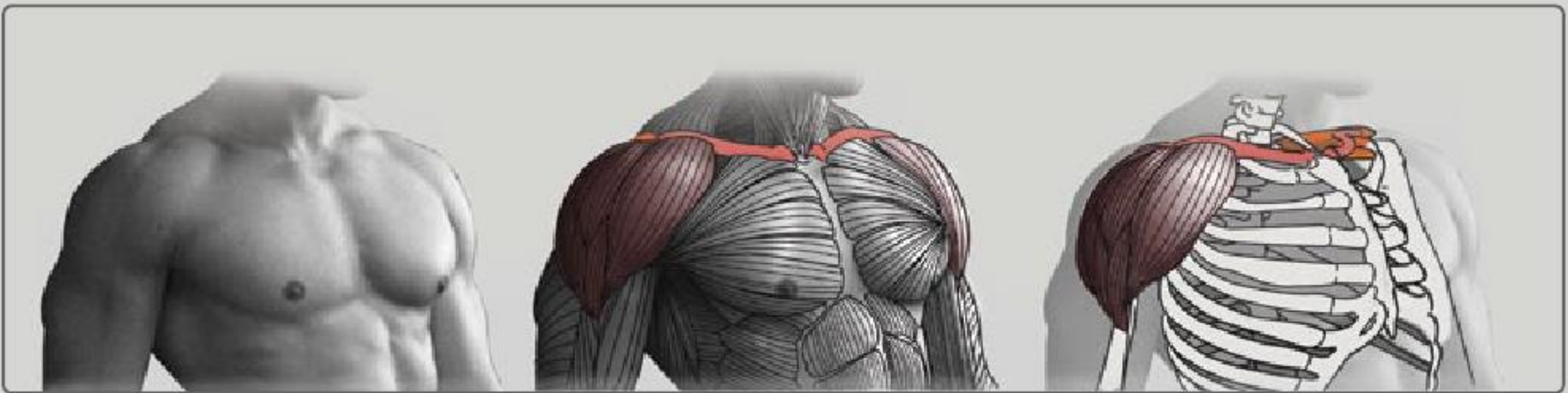
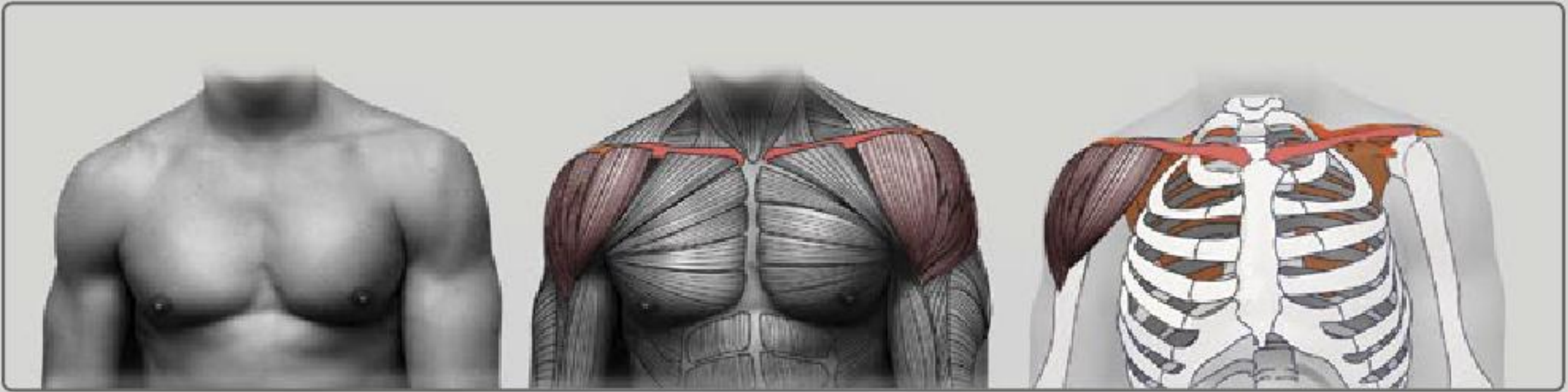
MUSCLES



- ① LATERAL END OF **CLAVICLE**
- ② HEAD OF **HUMERUS** PUSHES **SHOULDER MUSCLE (DELTOID)** OUTWARD.
- ③ **TRAPEZIUS**
- ④ LATERAL HEAD OF **SHOULDER MUSCLE (DELTOID)**
- ⑤ LATERAL HEAD OF **TRICEPS**



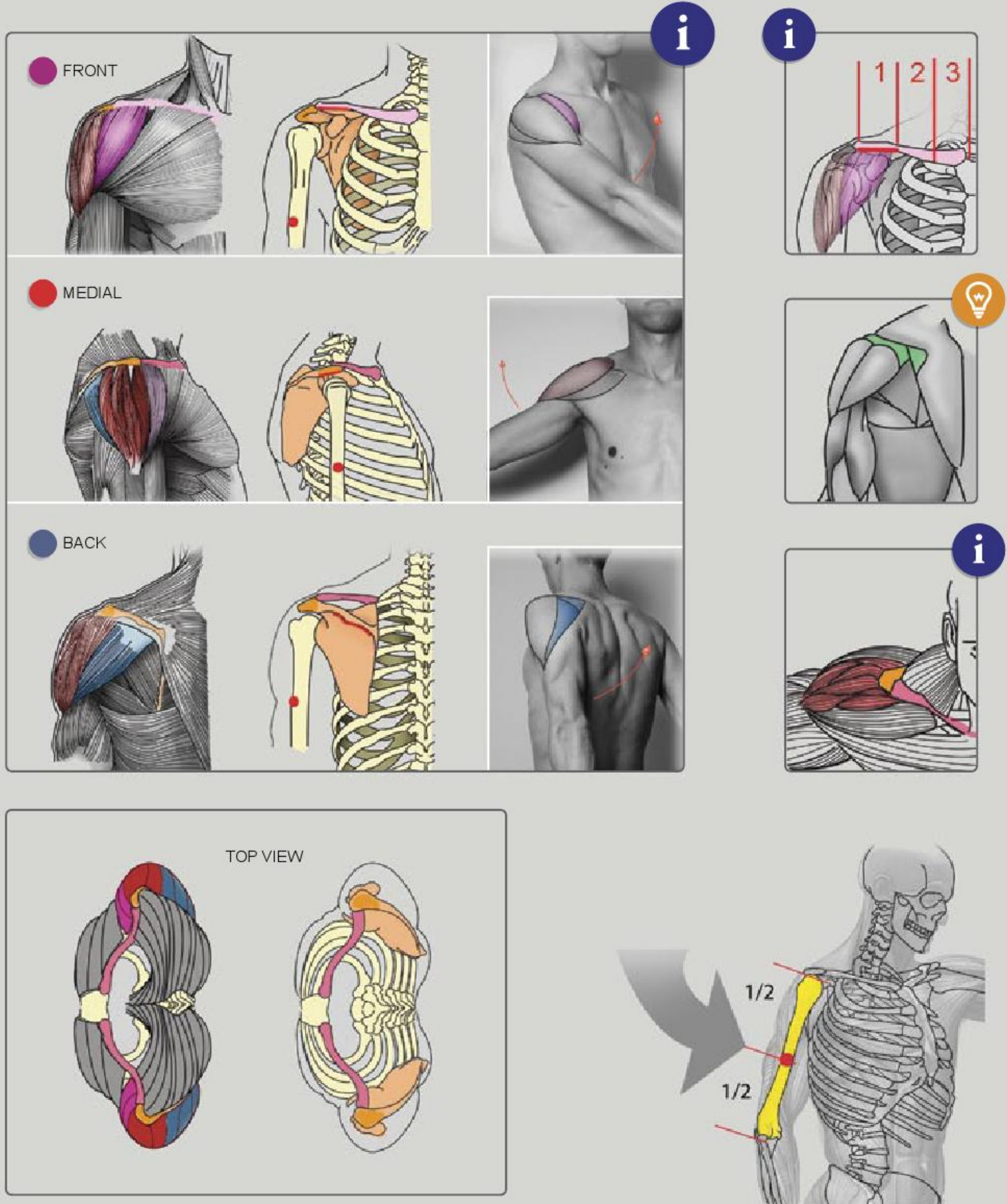
# SHOULDER MUSCLE (DELTOID)





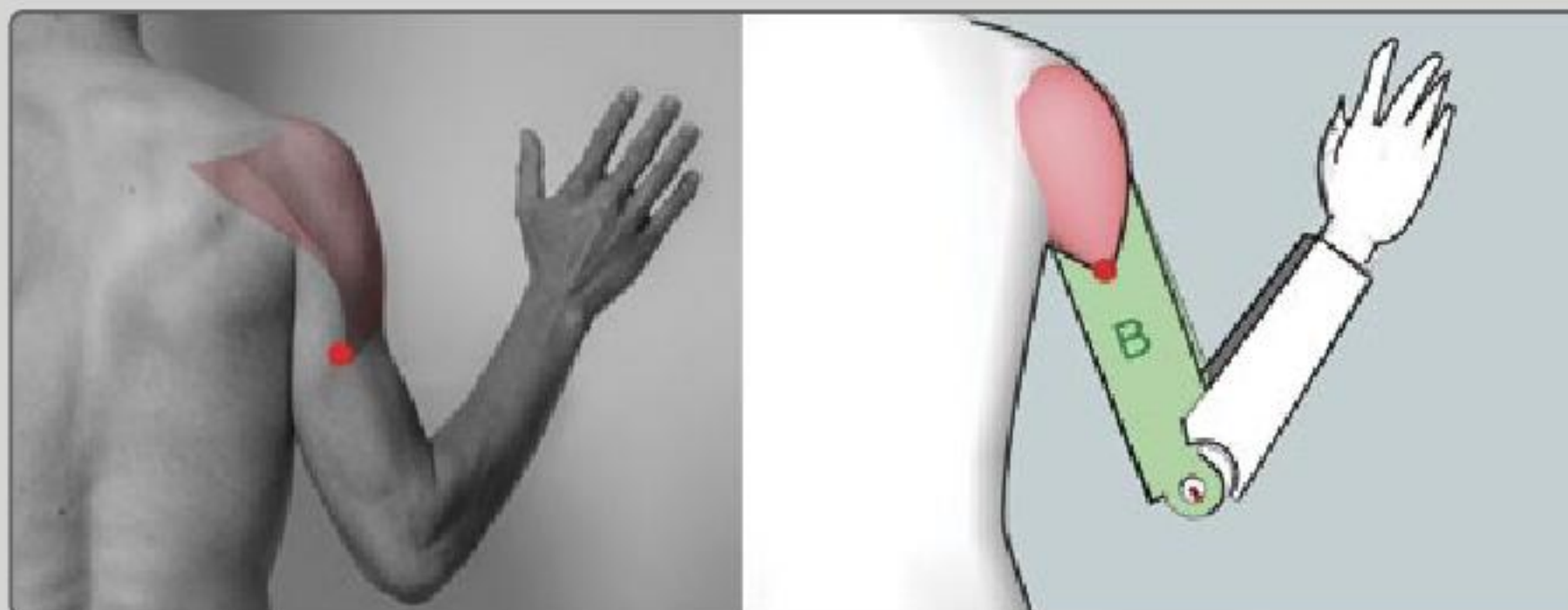
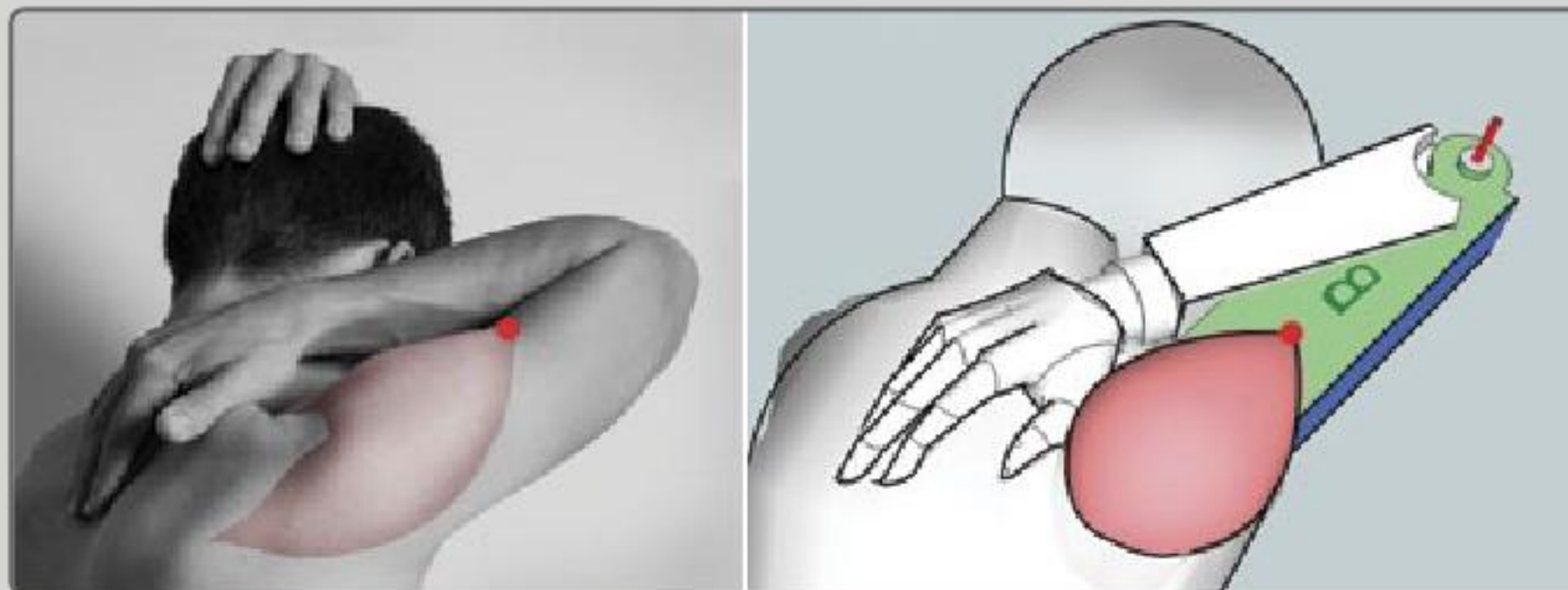
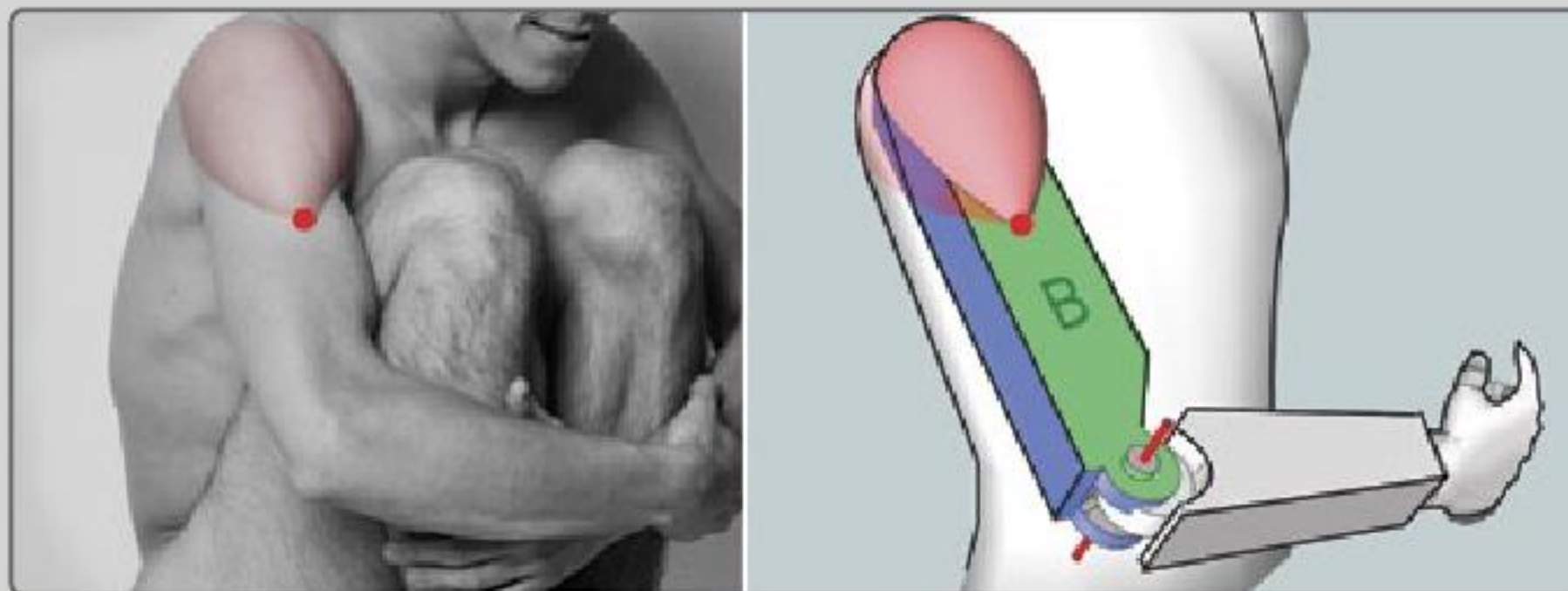
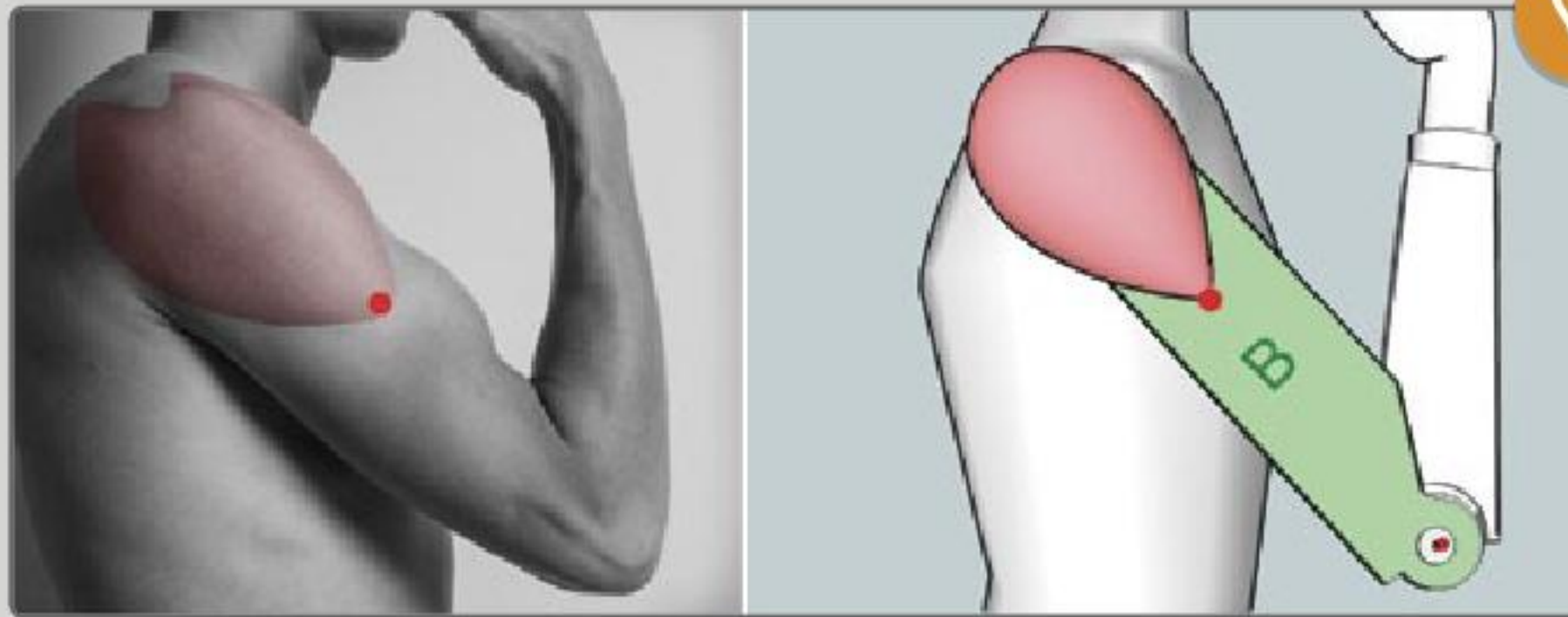
## SHOULDER MUSCLE (DELTOID) HAS 3 SECTIONS:

FRONT (ANTERIOR PART), MEDIAL (LATERAL PART) AND BACK (POSTERIOR PART)





WHICHEVER WAY YOU TURN YOUR ARM, **THE DELTOID'S LOWER, TAPERED END** IS ALWAYS ON THE **"B" SURFACE!**



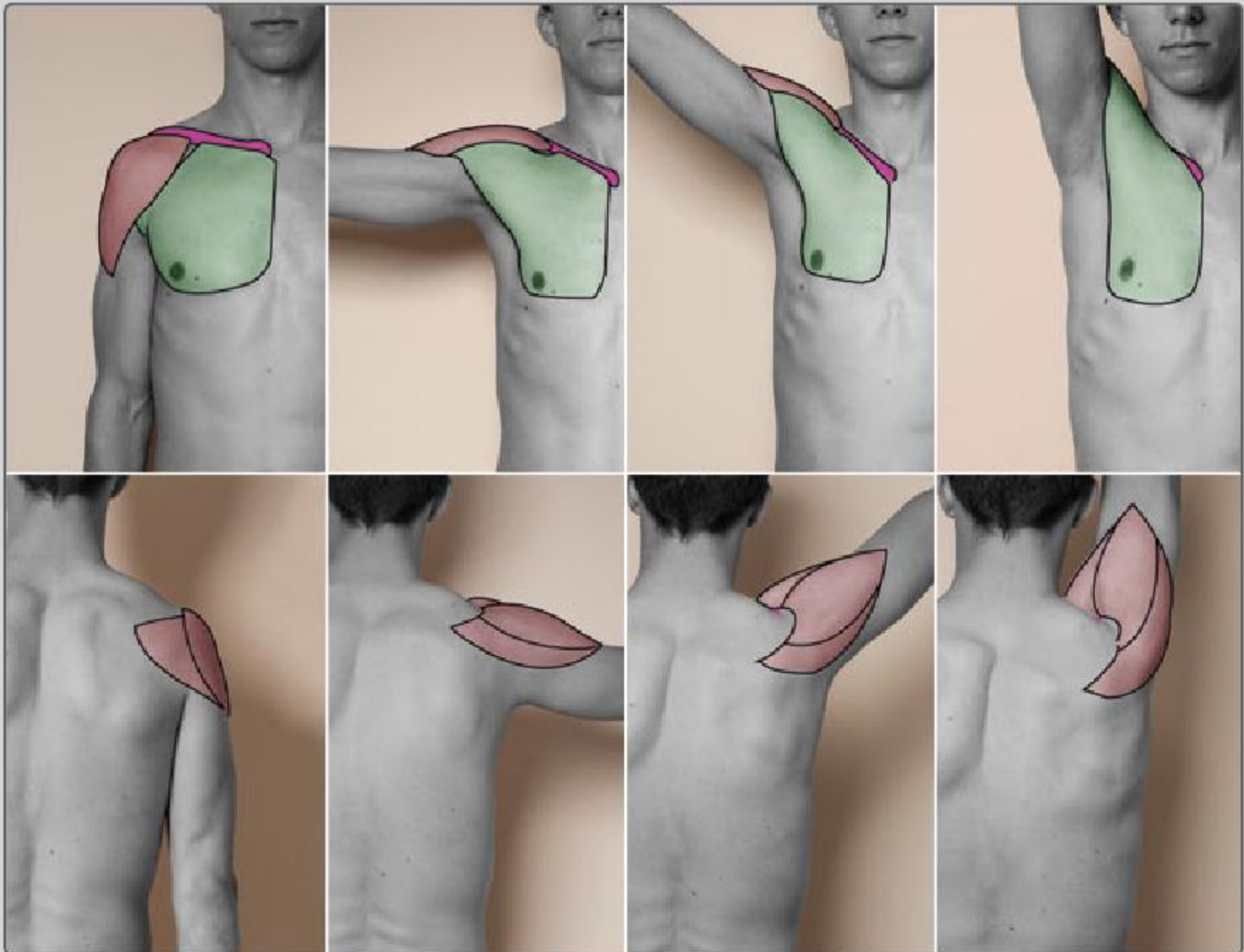
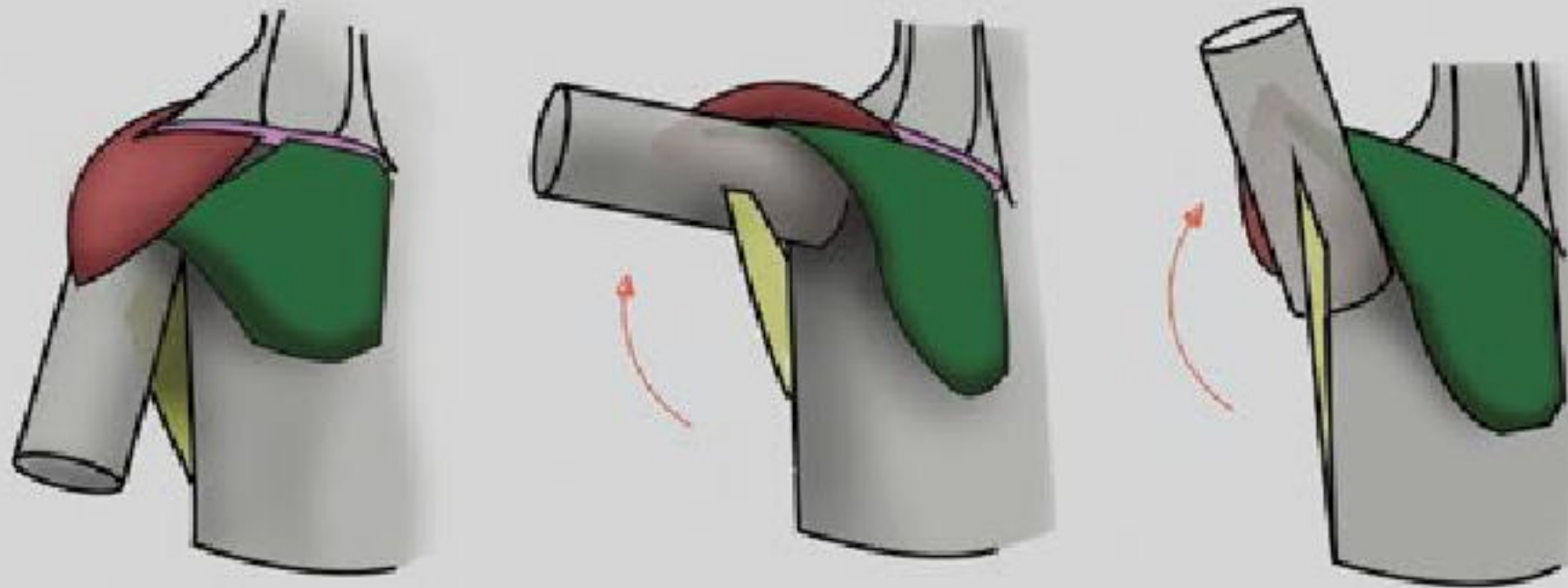


## WHERE DOES IT GO?



WHERE DOES **THE SHOULDER MUSCLE (DELTOID)** DISAPPEAR TO WHEN THE ARM IS LIFTED UP? IT JUST TURNS TOWARD THE BACK AND YOU WILL SEE IT IF YOU LOOK FROM THE OTHER SIDE.

**THE CLAVICLE** IS ONLY COVERED BY SKIN. IT IS ALWAYS VISIBLE EXCEPT WHEN ARMS ARE LIFTED. THEN, **THE CLAVICLE** IS HIDDEN BEHIND **THE GREAT CHEST MUSCLE (PECTORALIS MAJOR)**.





## TRAPEZIUS MUSCLE

i



**ORIGIN:** MEDIAL SUPERIOR NUCHAL LINE & EXTERNAL PROTUBERANCE OF THE SKULL

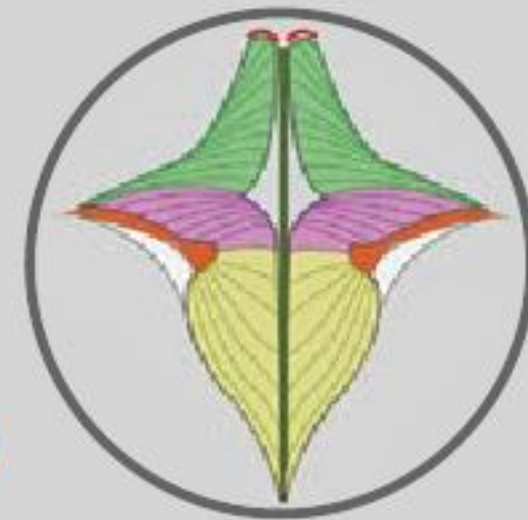
**INSERTION:** LATERAL CLAVICLE, ACROMION AND SPINE OF SCAPULA

**ACTIONS:**

**UPPER FIBERS:** ELEVATE AND UPWARDLY ROTATE SCAPULA; EXTEND NECK

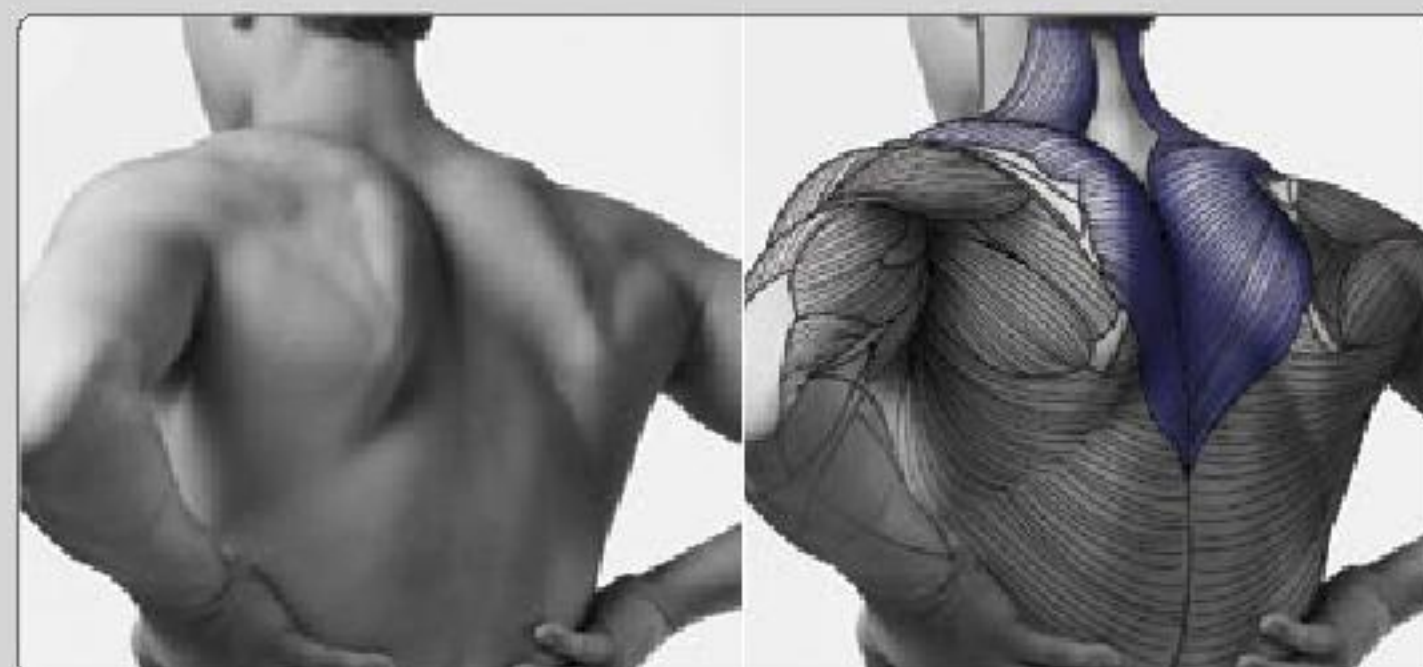
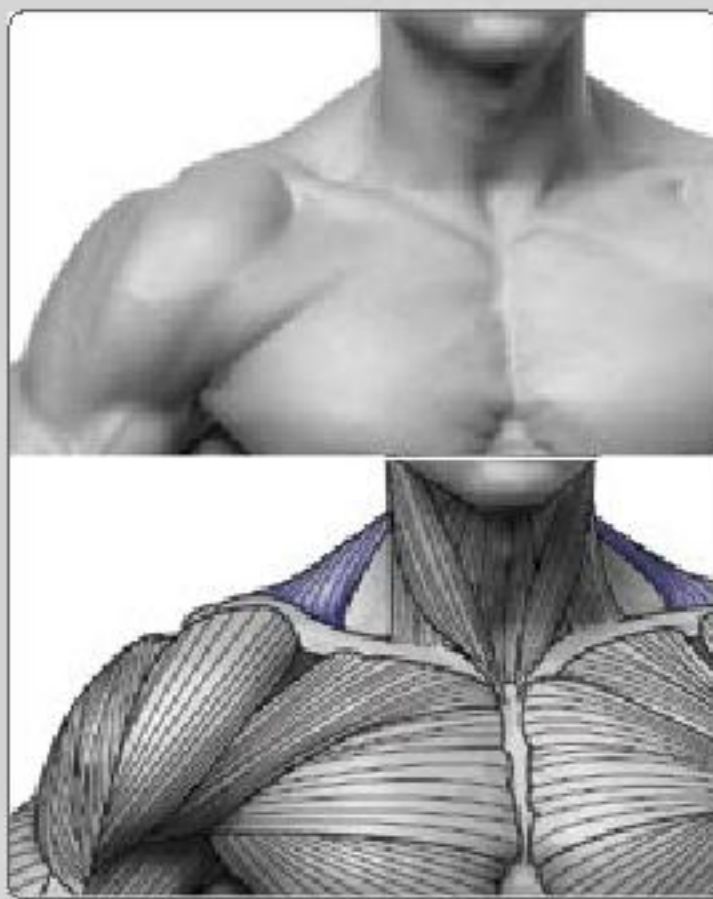
**MIDDLE FIBERS:** ADDUCT (RETRACT) SCAPULA

**LOWER FIBERS:** DEPRESS AND HELP UPPER FIBERS UPWARDLY ROTATE SCAPULA



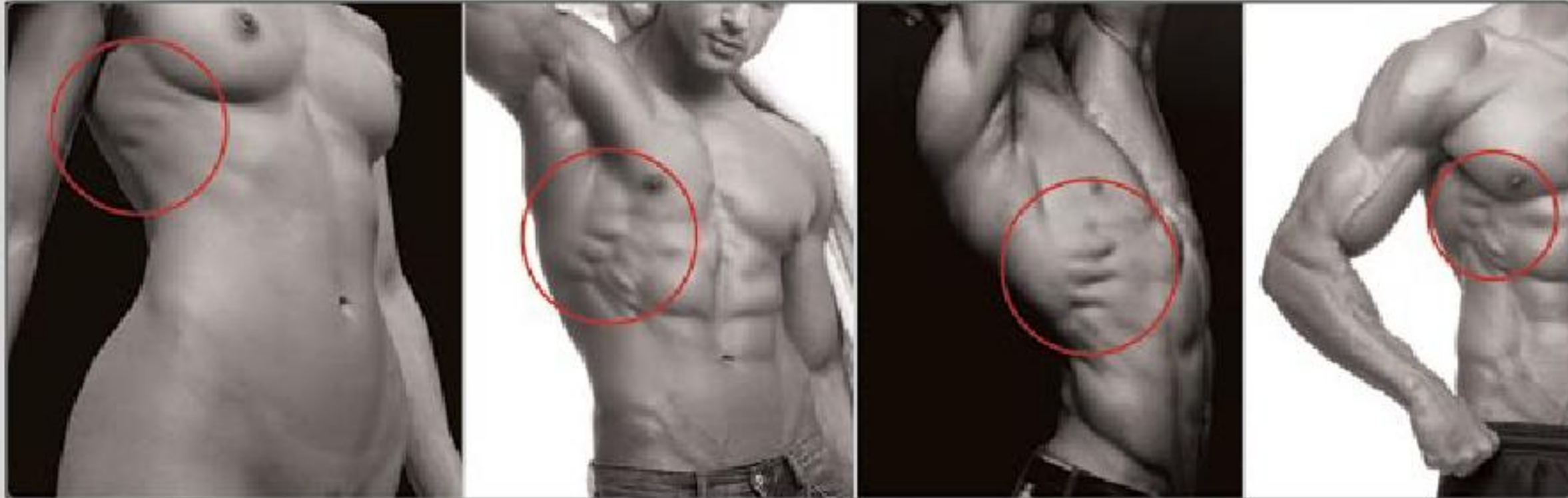


## TRAPEZIUS MUSCLE

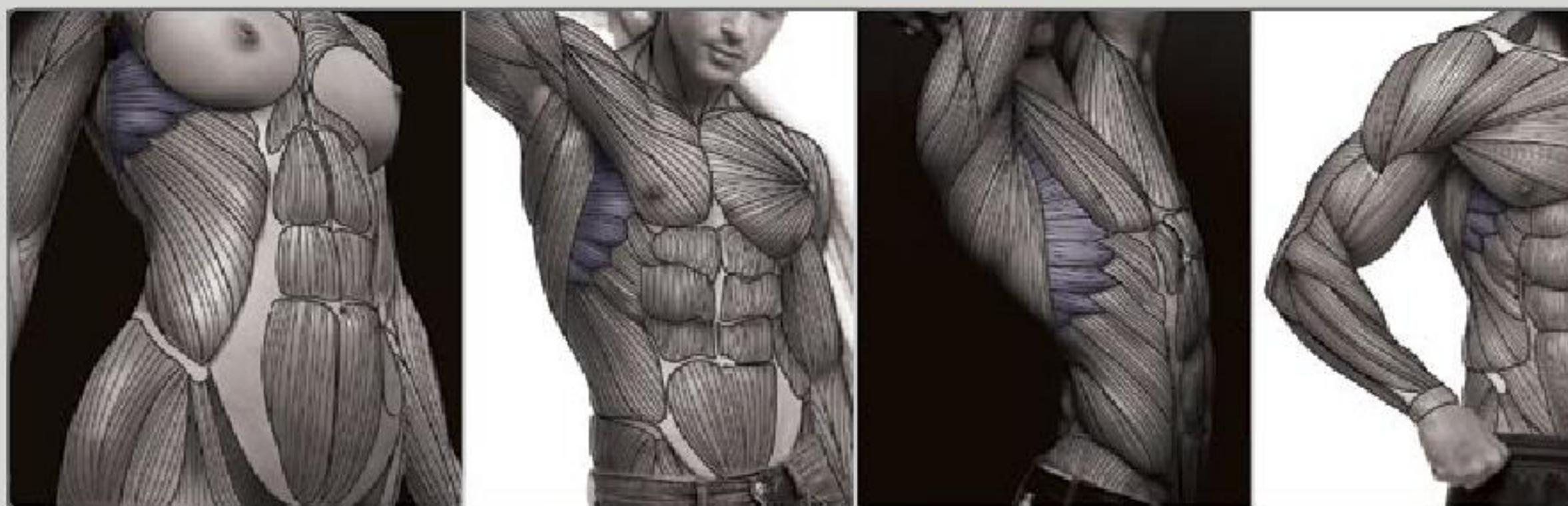




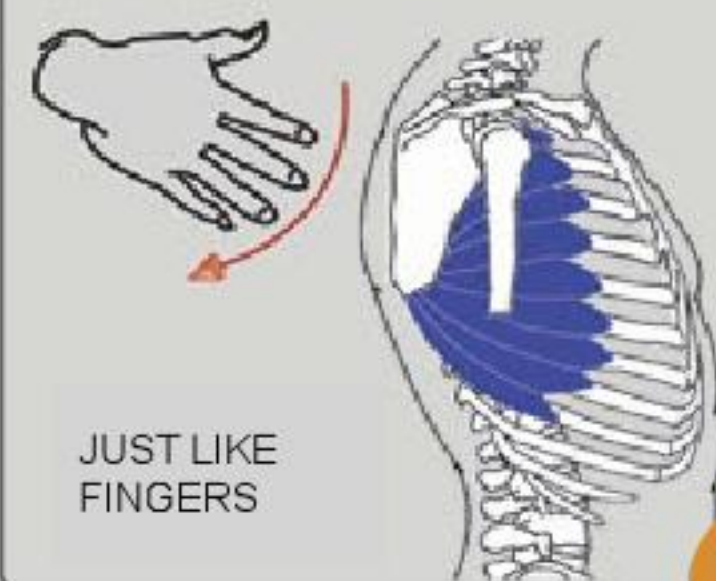
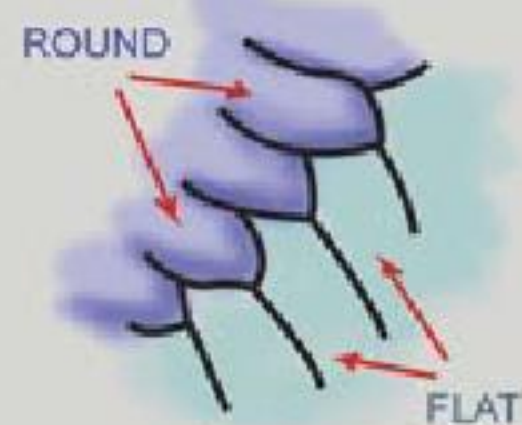
## ARE THESE RIBS?



THIS IS A MUSCLE, CALLED **SERRATUS ANTERIOR**

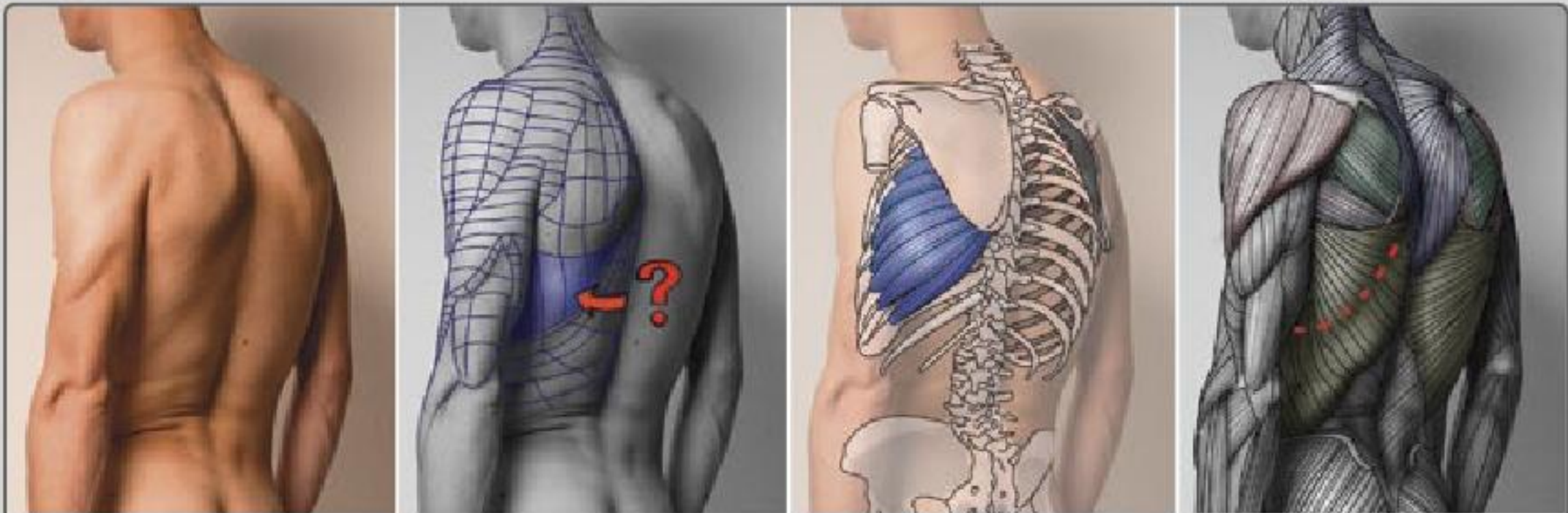


IF PERSON IS SKINNY,  
THEN **SERRATUS** IS TOO  
FLAT TO BE VISIBLE.





## WHAT IS THIS BULGE UNDER THE SHOULDER BLADE?

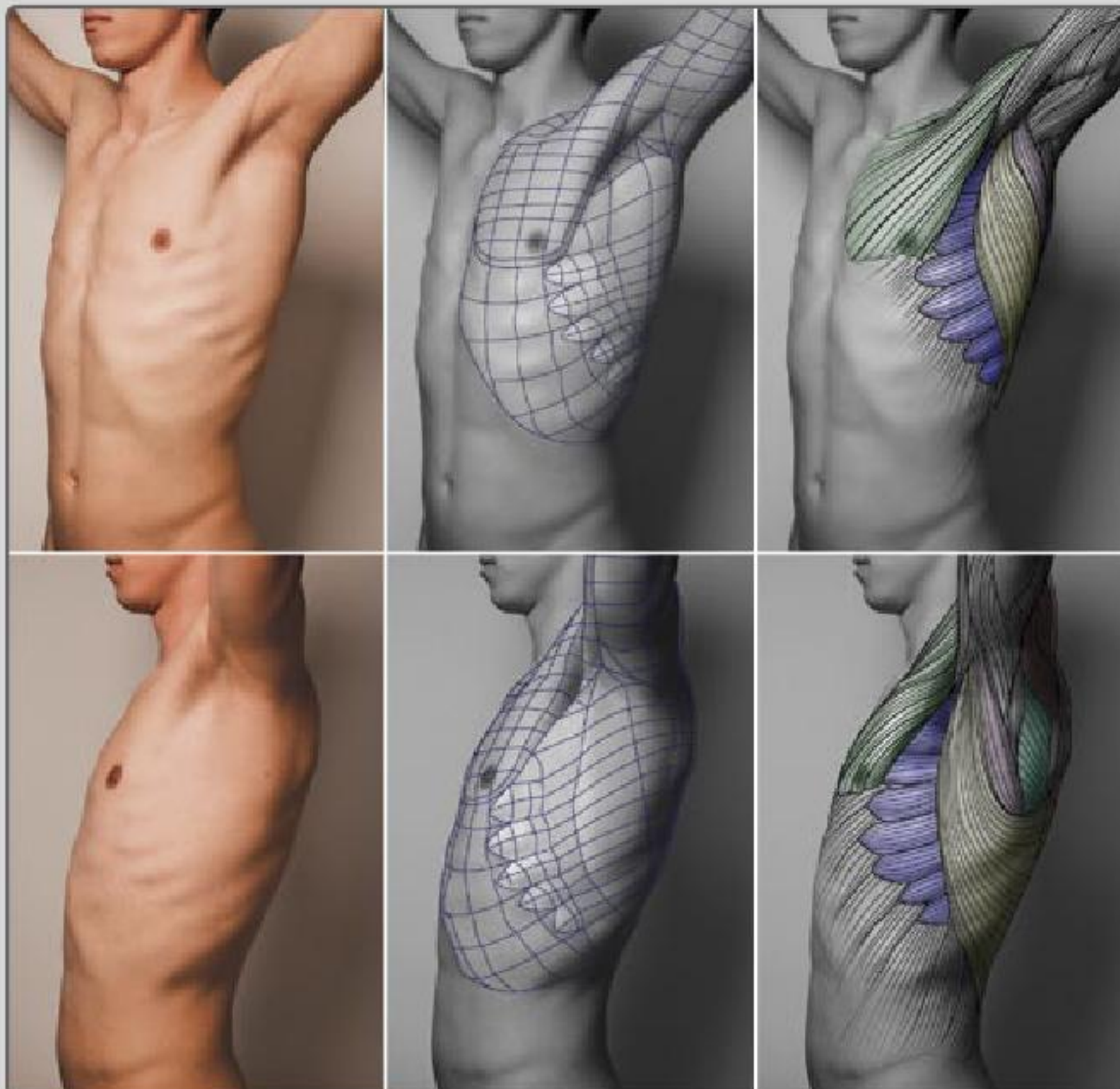


IT IS **THE SERRATUS ANTERIOR** MUSCLE, PUSHING THE **LATISSIMUS DORSI** OUTWARD FROM BENEATH.

i

**SERRATUS ANTERIOR** IS A MUSCLE THAT ORIGINATES ON THE SURFACES OF THE **1ST TO 8TH** RIBS ON THE LATERAL CHEST AND INSERTS ALONG THE ENTIRE ANTERIOR LENGTH OF THE MEDIAL BORDER OF THE SCAPULA.

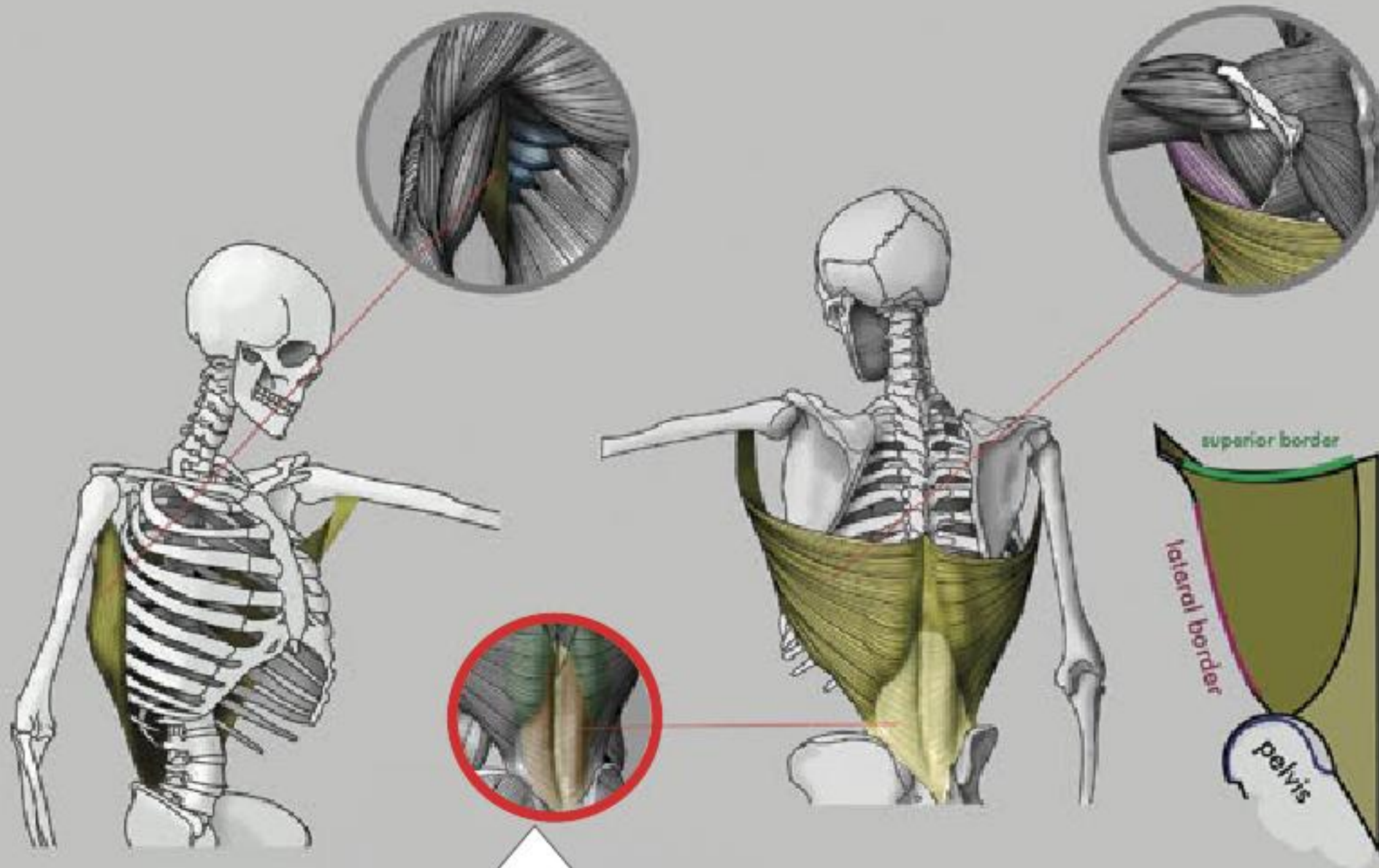
1/4 AND SIDE VIEW





## BROADEST MUSCLE OF THE BACK (LATISSIMUS DORSI – LD)

i



**NOTE:** THESE TWO SAUSAGES ARE NOT LD. THESE SHAPES ARE CREATED BY **THE ERECTOR SPINAE** PUSHING UP THE LD FROM BELOW.

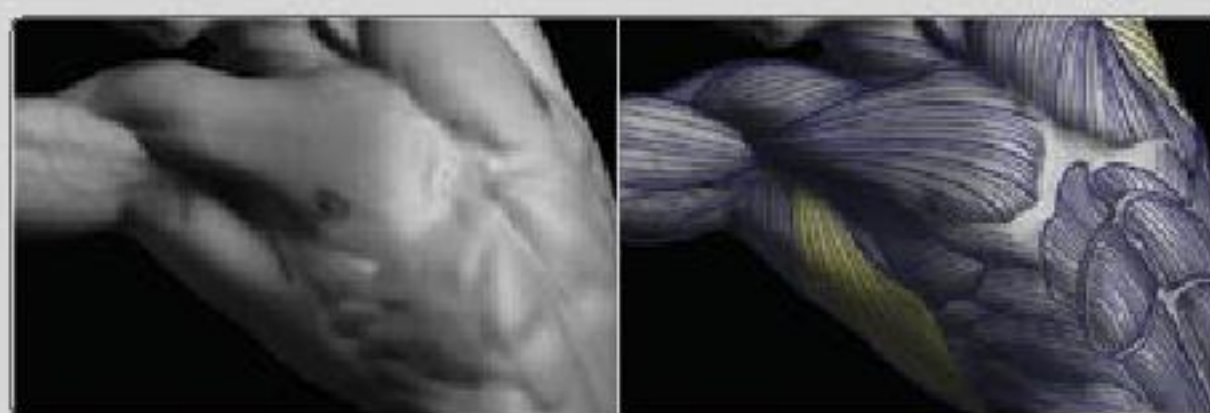
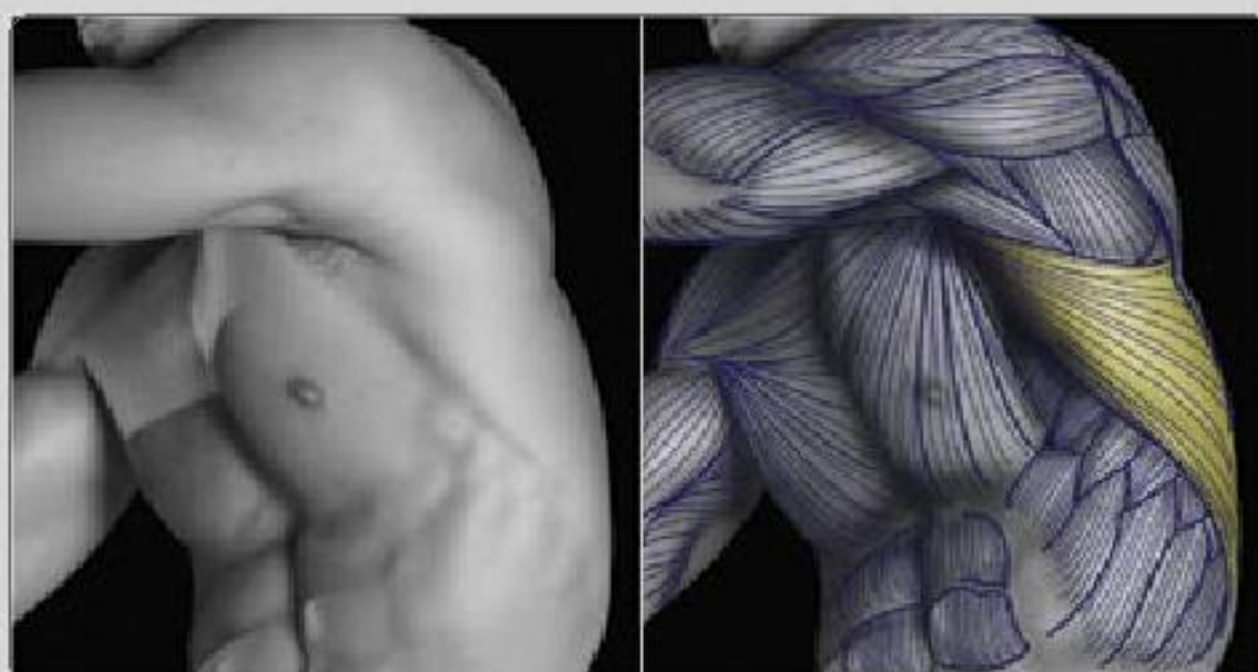
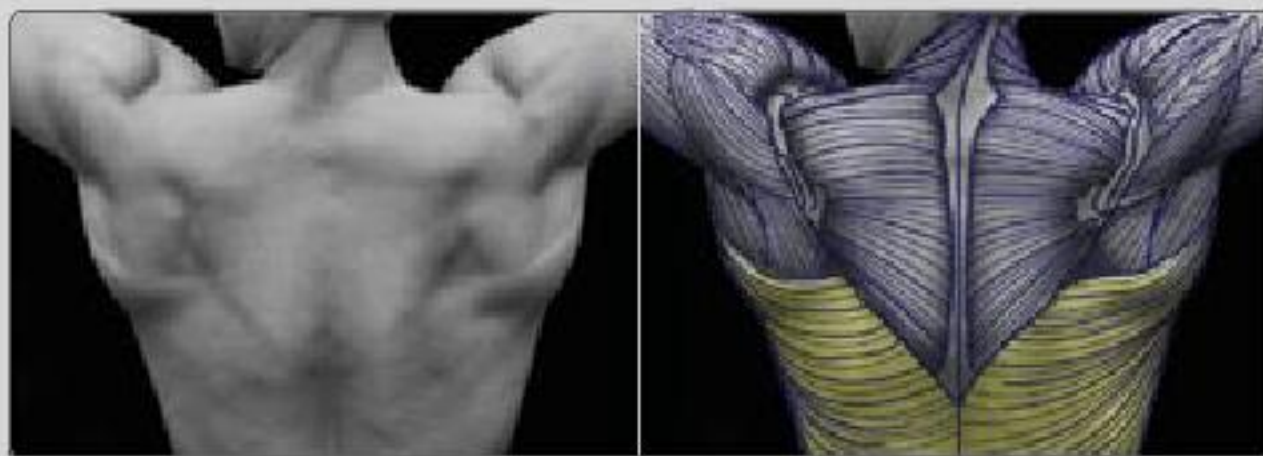


**TERES MAJOR** COVERED WITH **LATISSIMUS DORSI** CREATES THE TRIANGULAR SHAPE OF A MALE TORSO.





## IDENTIFY THE BROADEST MUSCLE OF THE BACK! (LATISSIMUS DORSI)



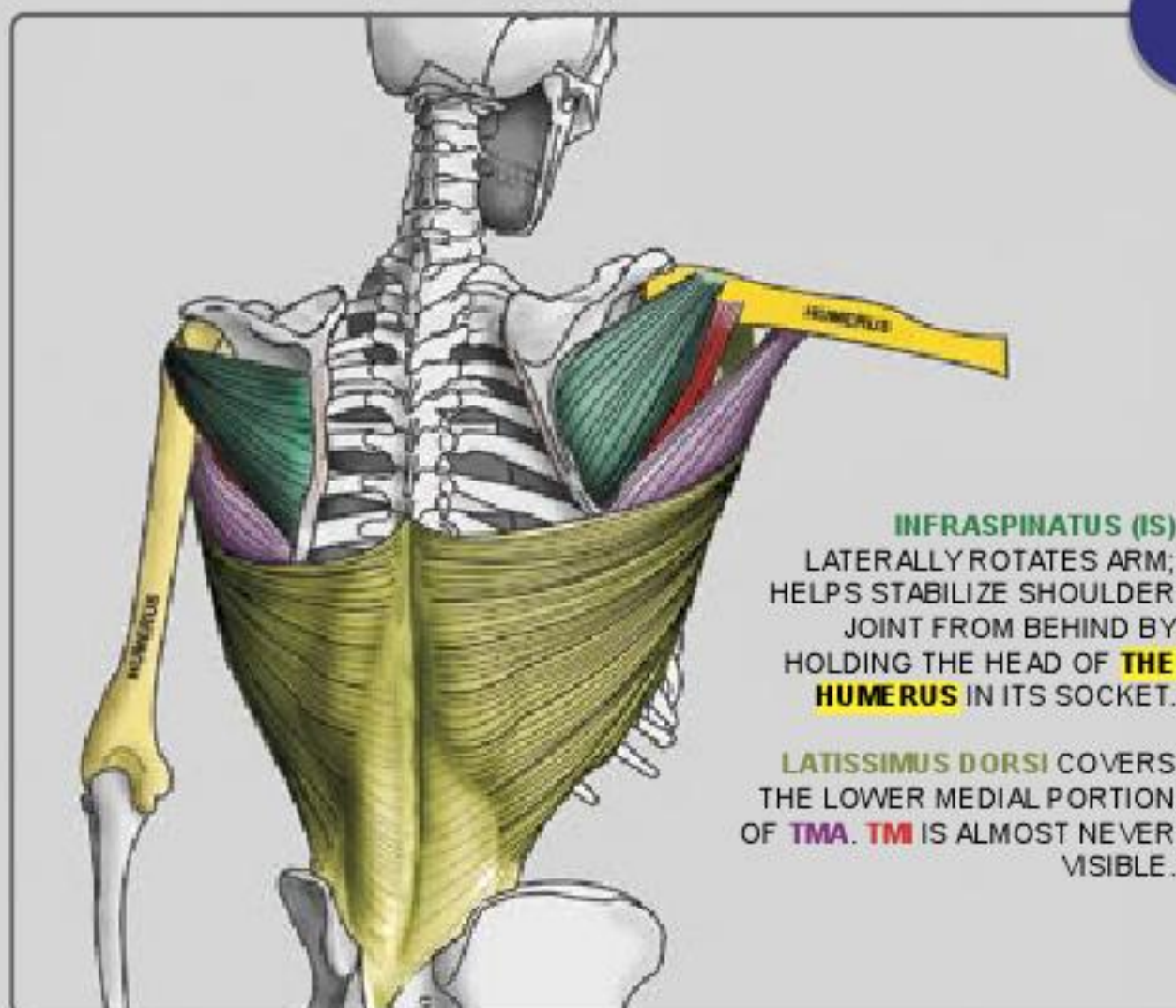


## GREAT ROUND MUSCLE (TERES MAJOR TMA), LITTLE ROUND MUSCLE (TERES MINOR TMI) AND INFRASPINATUS MUSCLE (IS)

i

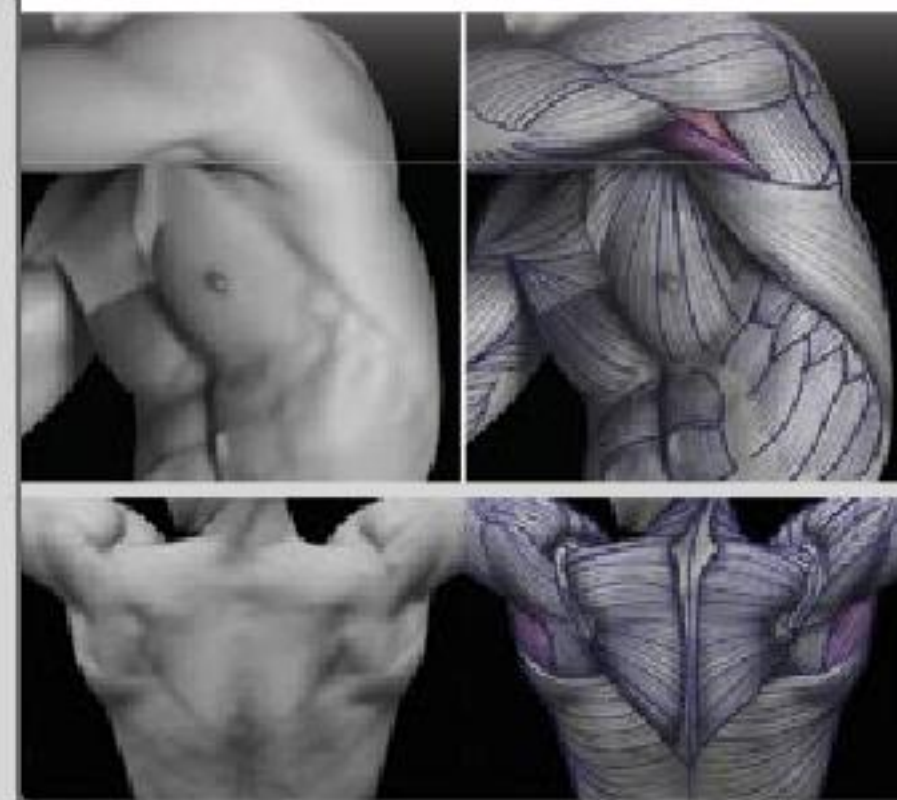


i



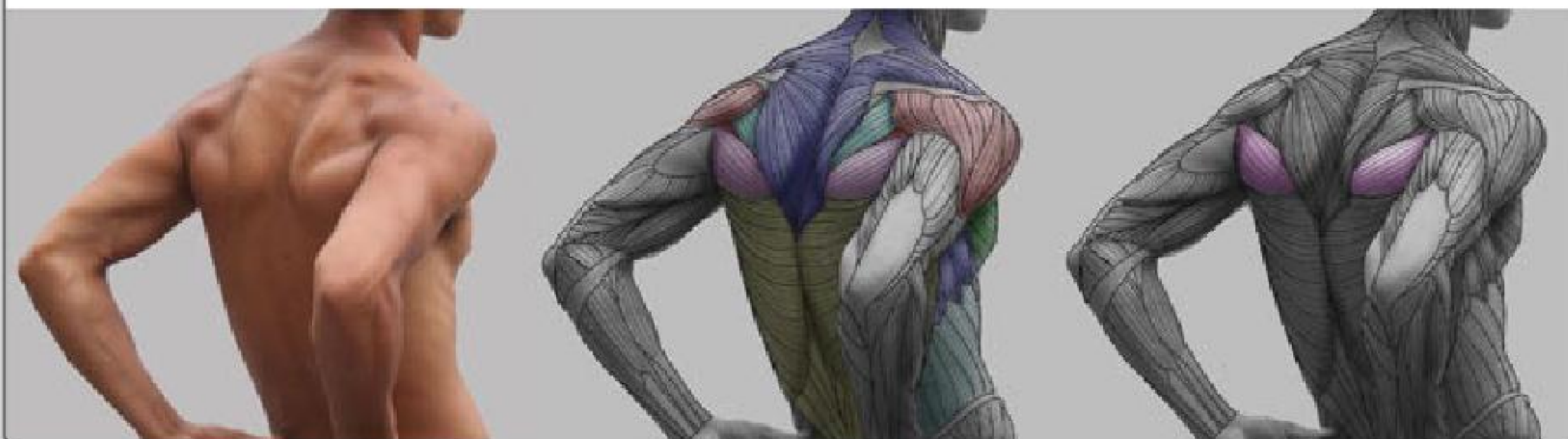
i

**TMI** IS ALMOST NEVER VISIBLE.



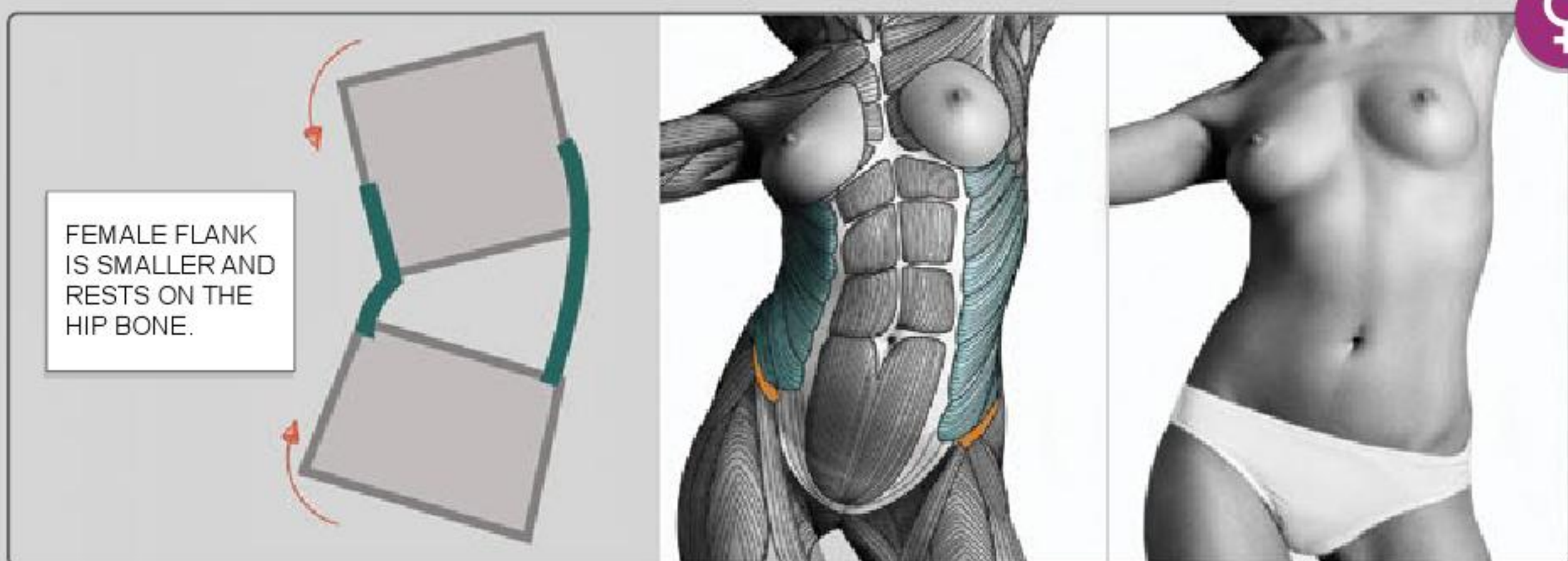
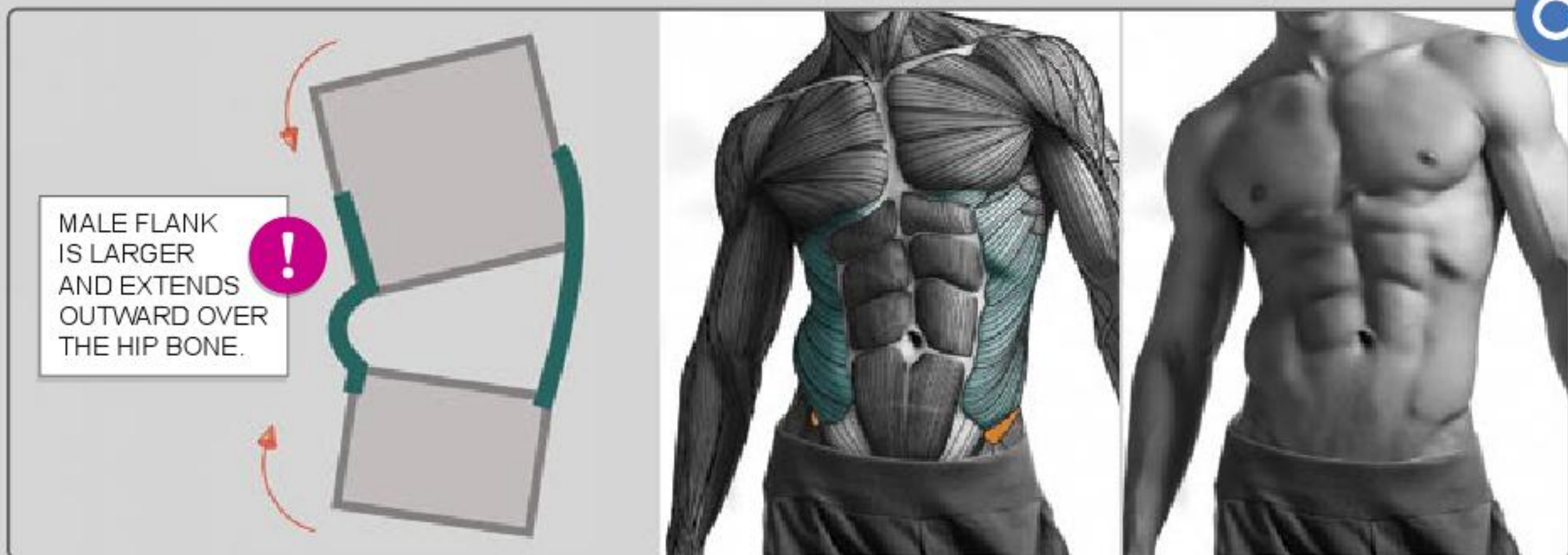
i

**GREAT ROUND MUSCLE (TERES MAJOR)** BECOMES PRONOUNCED WHEN ARMS ARE HELD BEHIND THE TORSO.



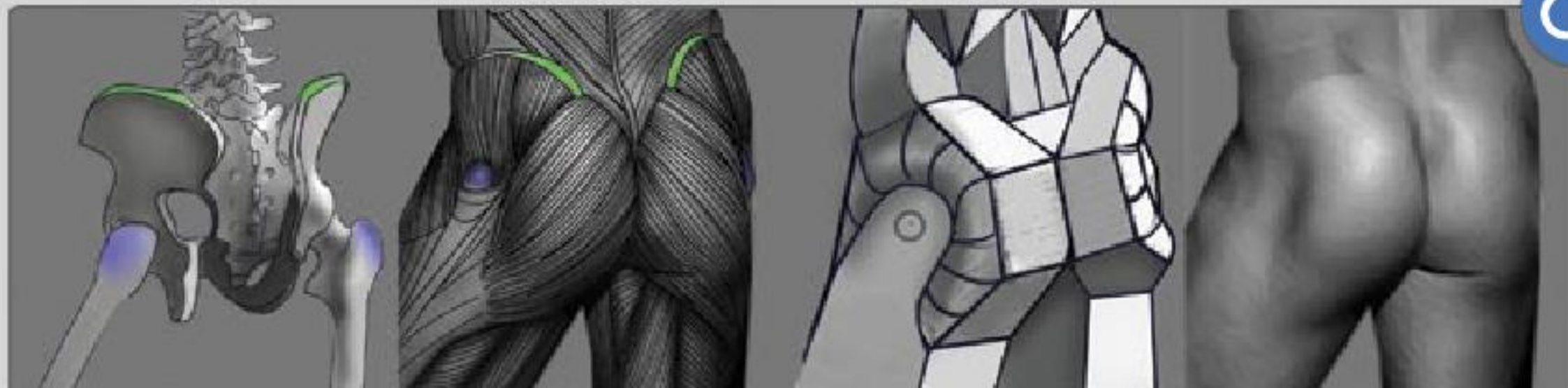


## ABDOMINAL EXTERNAL OBLIQUE MUSCLE (EO)





## MALE AND FEMALE HIPs

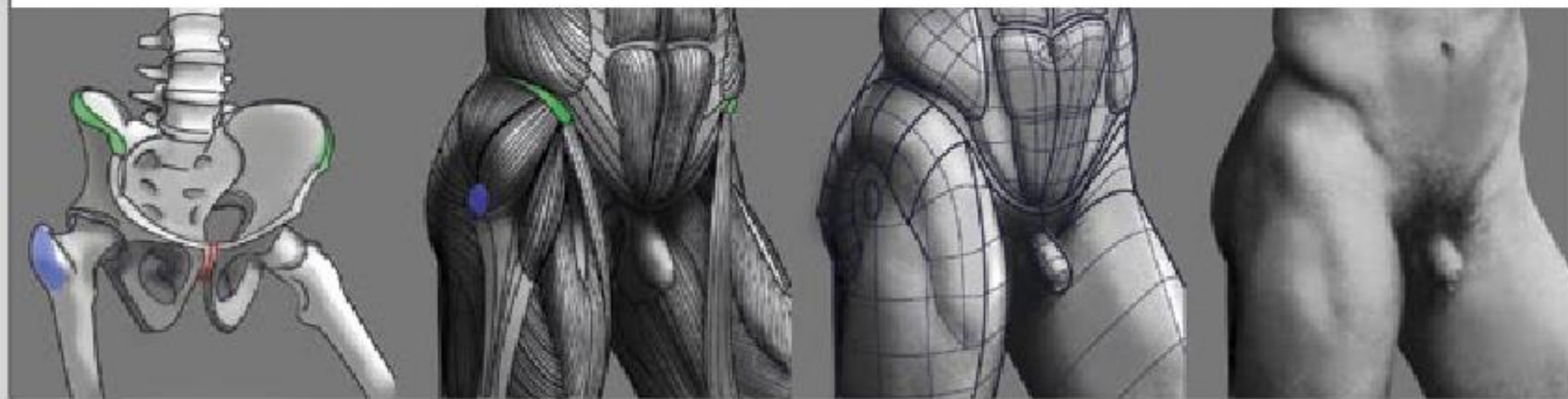


BONES

MUSCLES

BLOCK-OUT

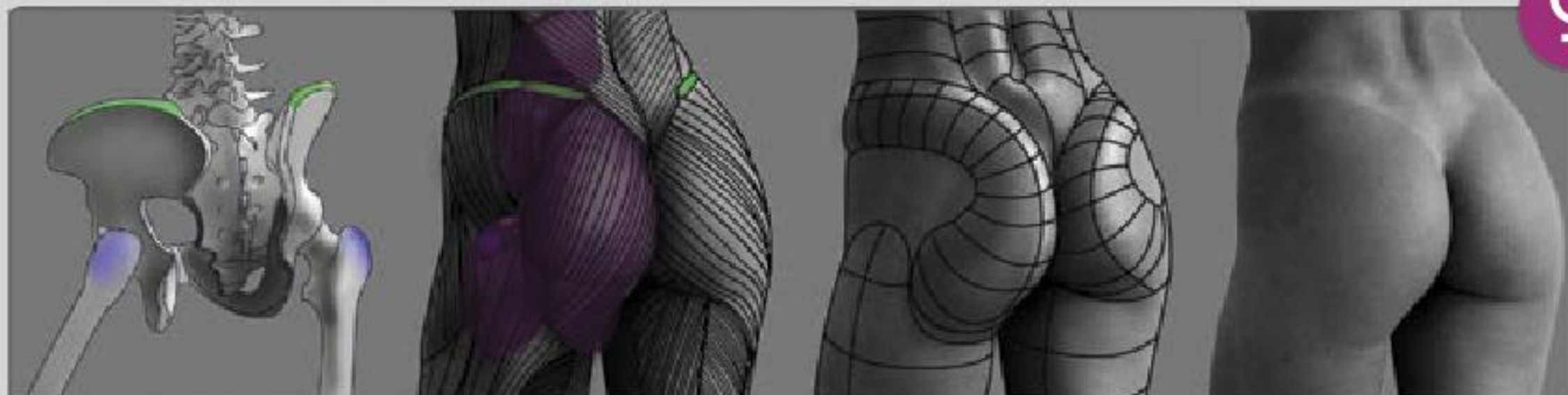
REAL



● GREATER TROCHANTER

● ILIAC CREST

● PUBIC SYMPHYSIS



BONES

MUSCLES

BLOCK-OUT

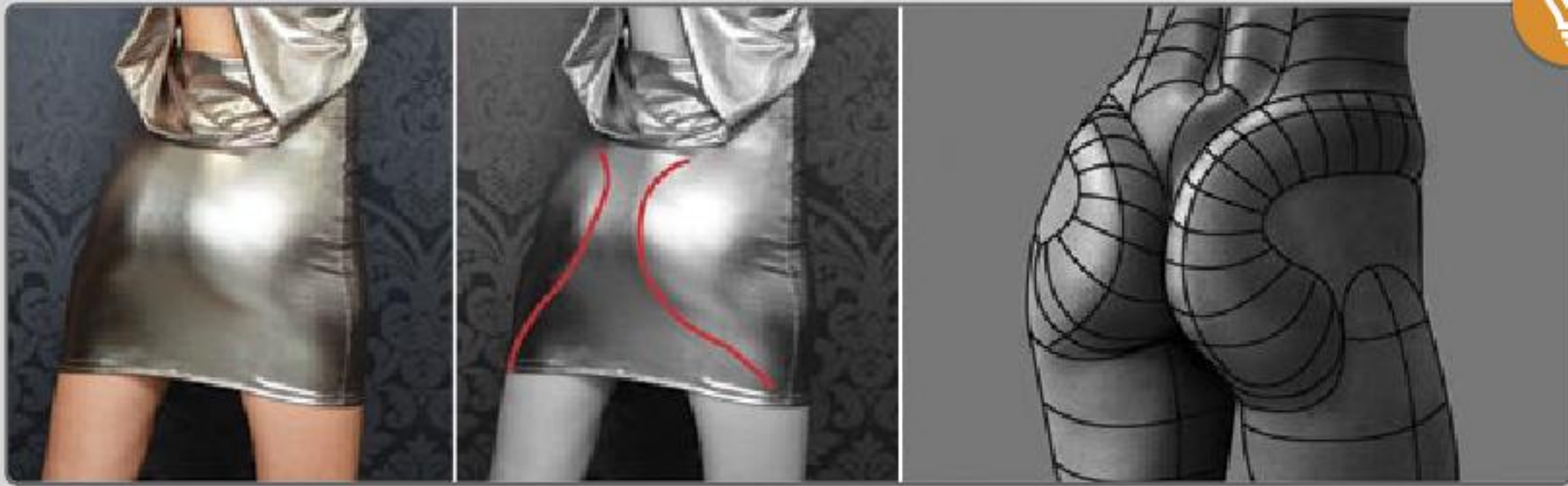
REAL



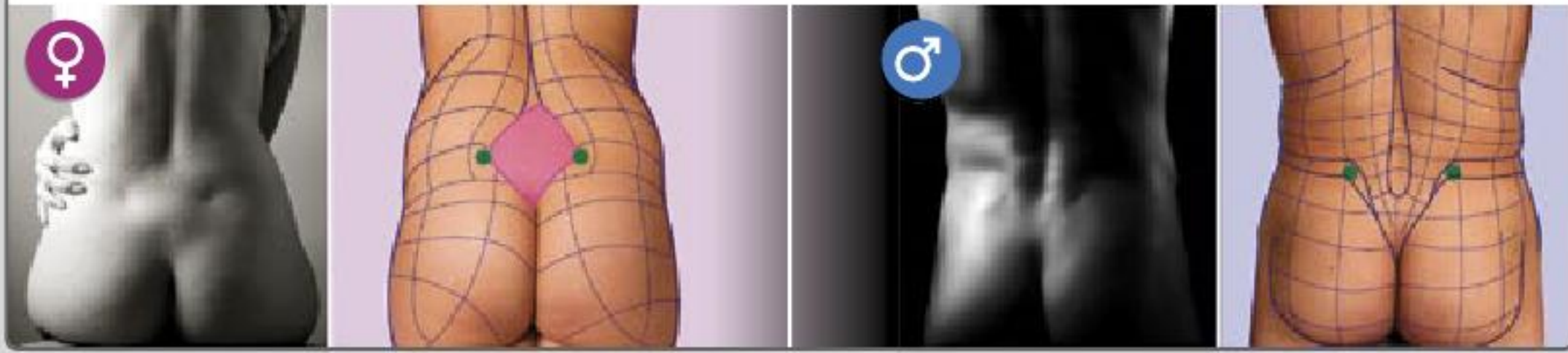
SUBCUTANEOUS **FAT PADS** UNDER THE SKIN GIVE FEMALE HIPs THEIR CURVY SHAPE.



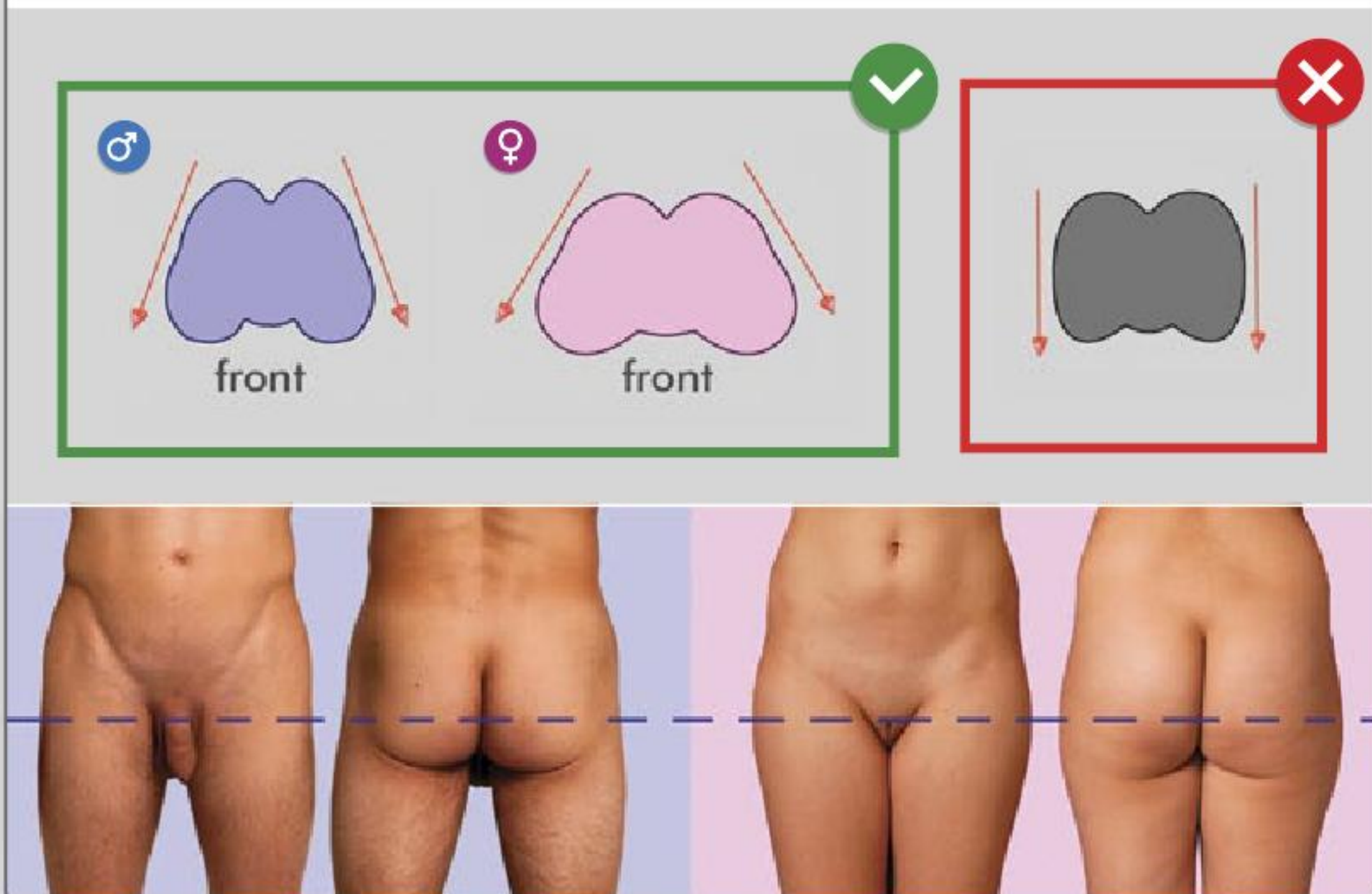
## ALL ABOUT “BACKSIDES”



THE “RHOMBUS OF MICHAELIS” IS A FAT PAD THAT IS SOMETIMES VISIBLE ON THE LOWER BACK OF FEMALES.

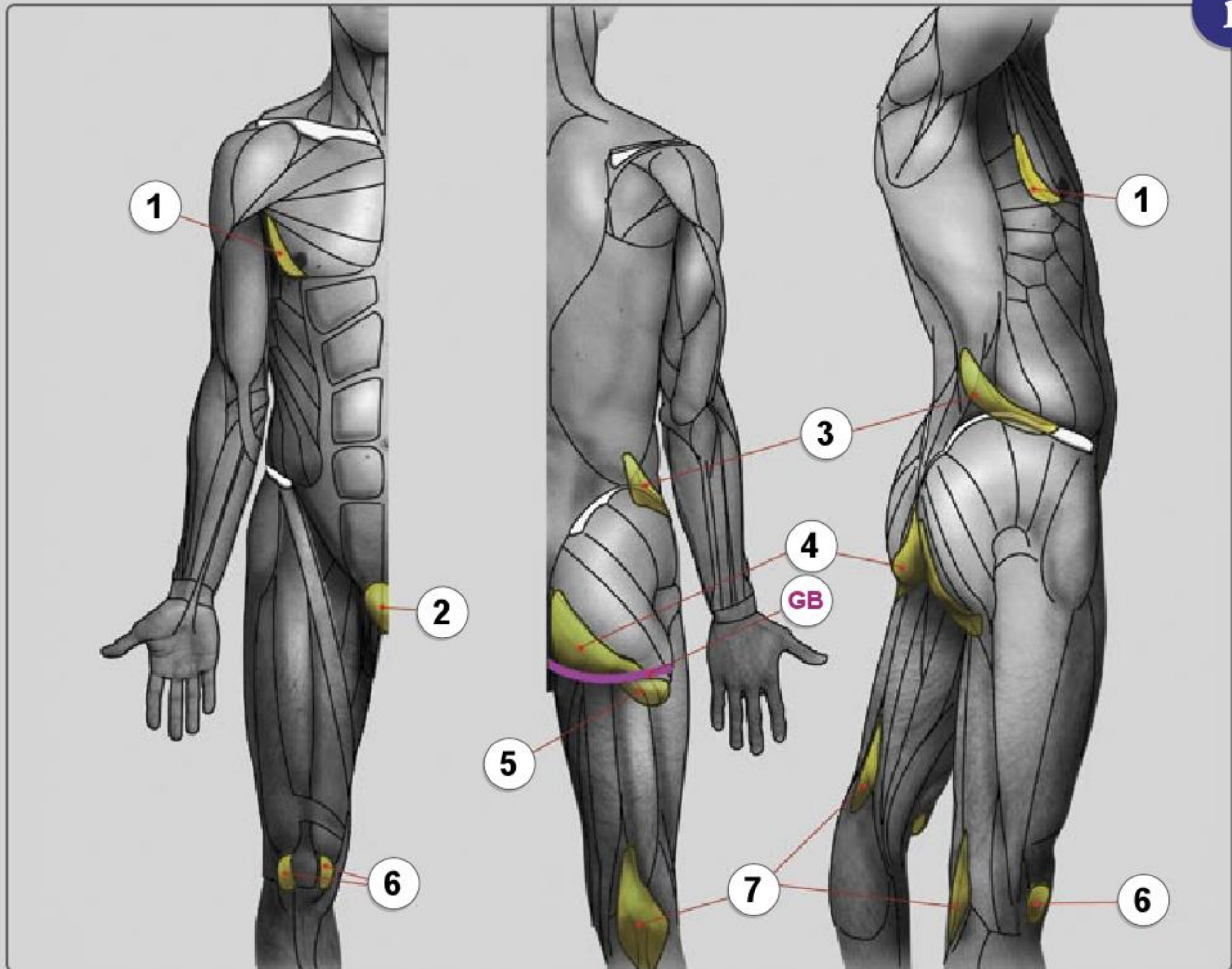


HORIZONTAL CROSS SECTIONS OF MALE AND FEMALE PELVIS.

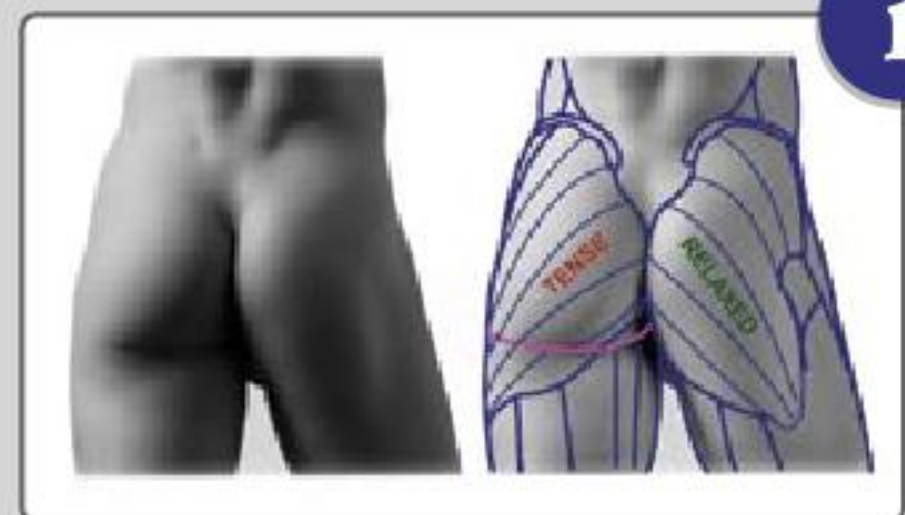
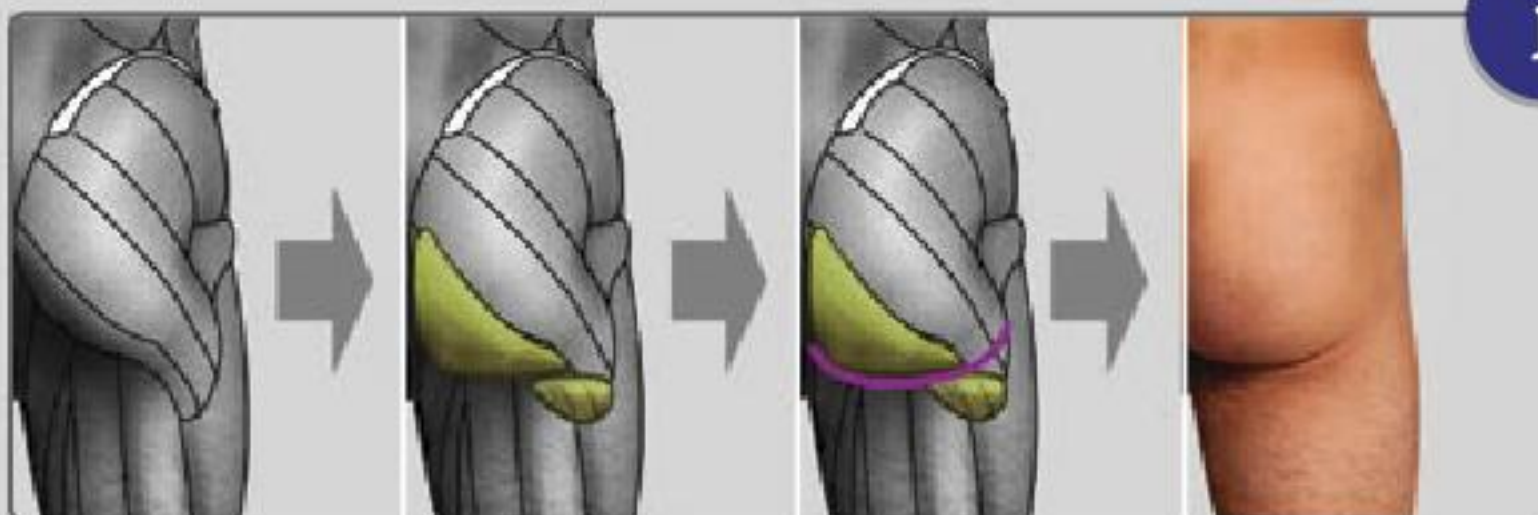




## MALE SUBCUTANEOUS FAT PADS



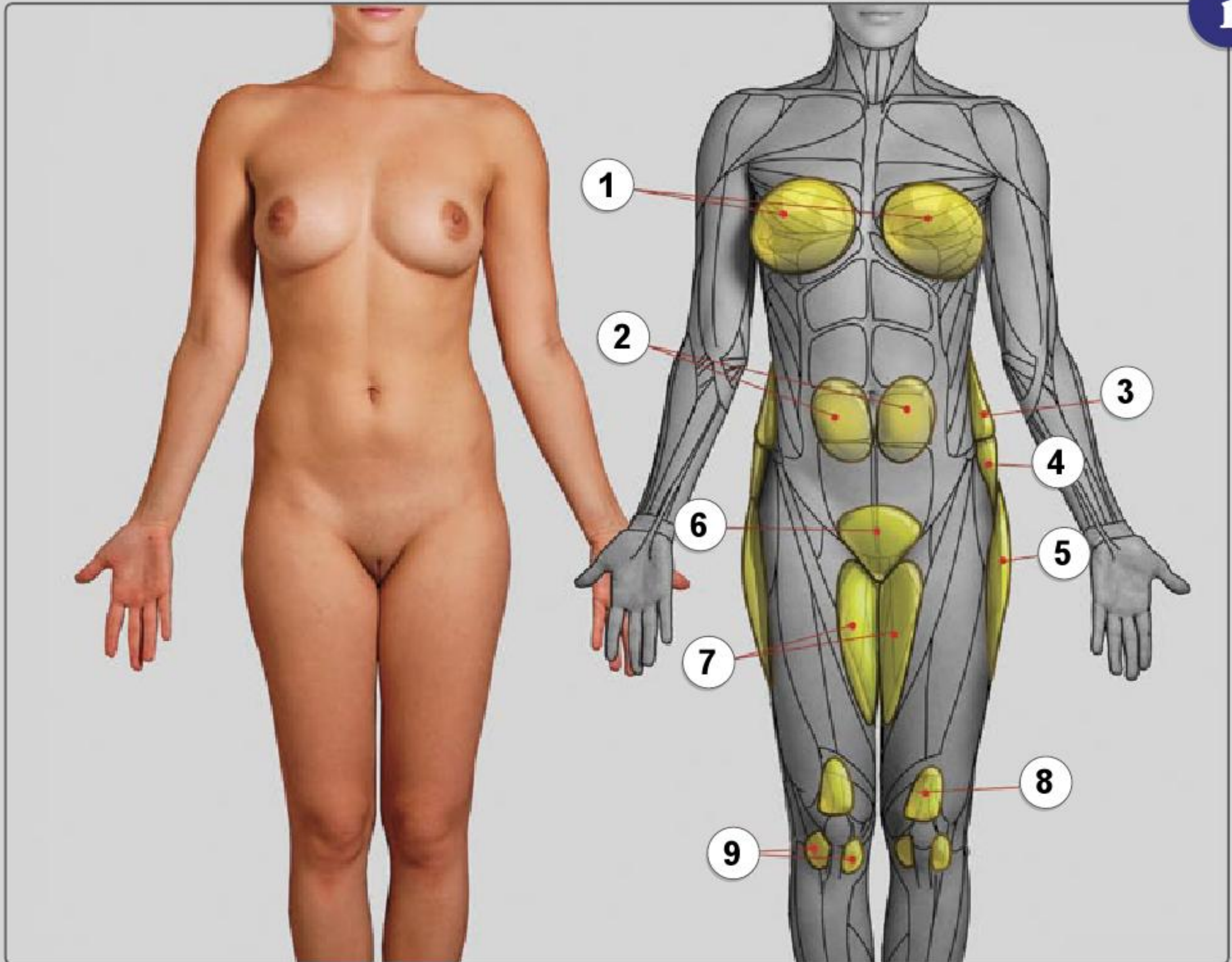
- |                    |                                  |                                                                                             |
|--------------------|----------------------------------|---------------------------------------------------------------------------------------------|
| 1 PECTORAL FAT PAD | 4 LATERAL GLUTEAL FAT PAD        | 7 POPLITEAL FAT PAD                                                                         |
| 2 PUBIC FAT PAD    | 5 INFERIOR GLUTEAL FAT EXTENSION | GB <b>GLUTEAL BAND</b> – CREATES SKIN FOLD. WHEN THE THIGH FLEXES, GLUTEAL FOLD DISAPPEARS. |
| 3 FLANK FAT PAD    | 6 INFRAPATELLAR FAT PAD          |                                                                                             |



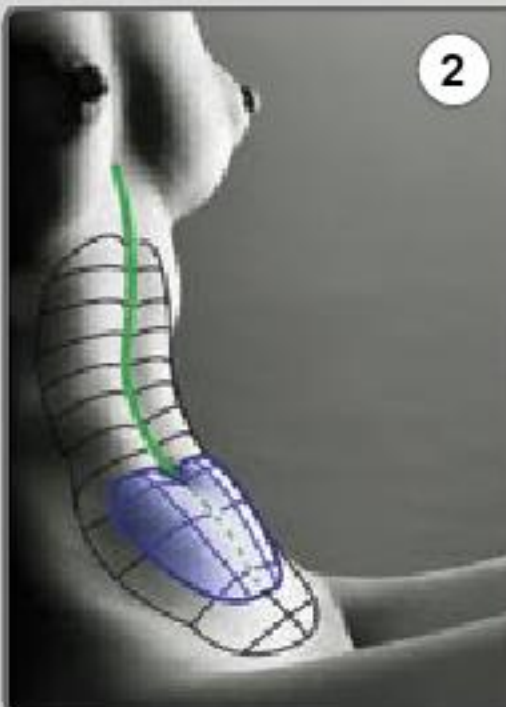


## FEMALE SUBCUTANEOUS FAT PADS (FRONT VIEW)

i

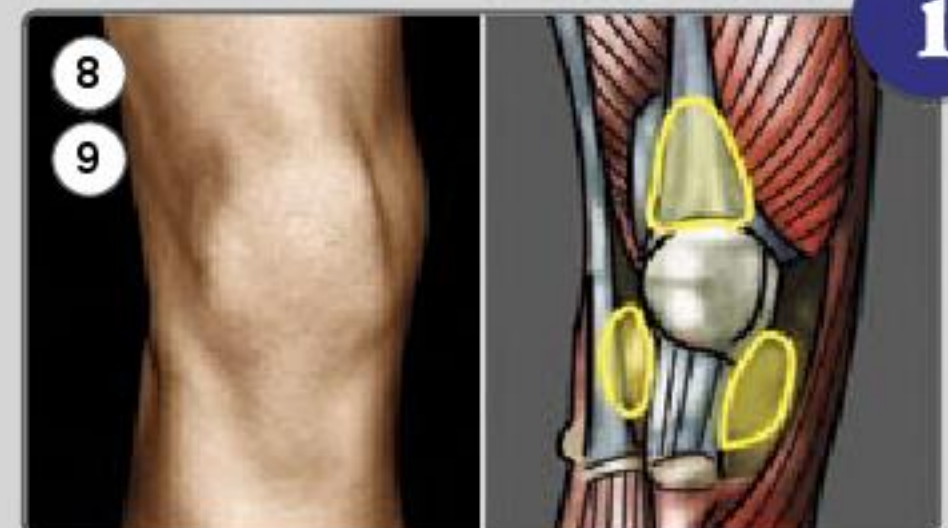


- |                          |                           |                                |
|--------------------------|---------------------------|--------------------------------|
| 1 BREAST FAT             | 4 LATERAL GLUTEAL FAT PAD | 6 PUBIC FAT PAD                |
| 2 ABDOMINAL WALL FAT PAD | 5 OUTER THIGH FAT PAD     | 7 INNER THIGH FAT PAD          |
| 3 FLANK FAT PAD          |                           | 8 LOWER ANTERIOR THIGH FAT PAD |
|                          |                           | 9 INFRAPATELLAR FAT PAD        |



2

AS **ABDOMINAL WALL FAT PADS (AWFP)** GET LARGER, THAT PART OF **THE LINEA ALBA** WHICH CONTINUES UNDER THE NAVEL, WILL BE LESS PRONOUNCED, BECAUSE ARE COVERED BY A THICKER LAYER OF FAT. WHEN THERE IS SOME EXCESS BELLY FAT, **THE AWFP** APPEARS "APPLE" SHAPED.

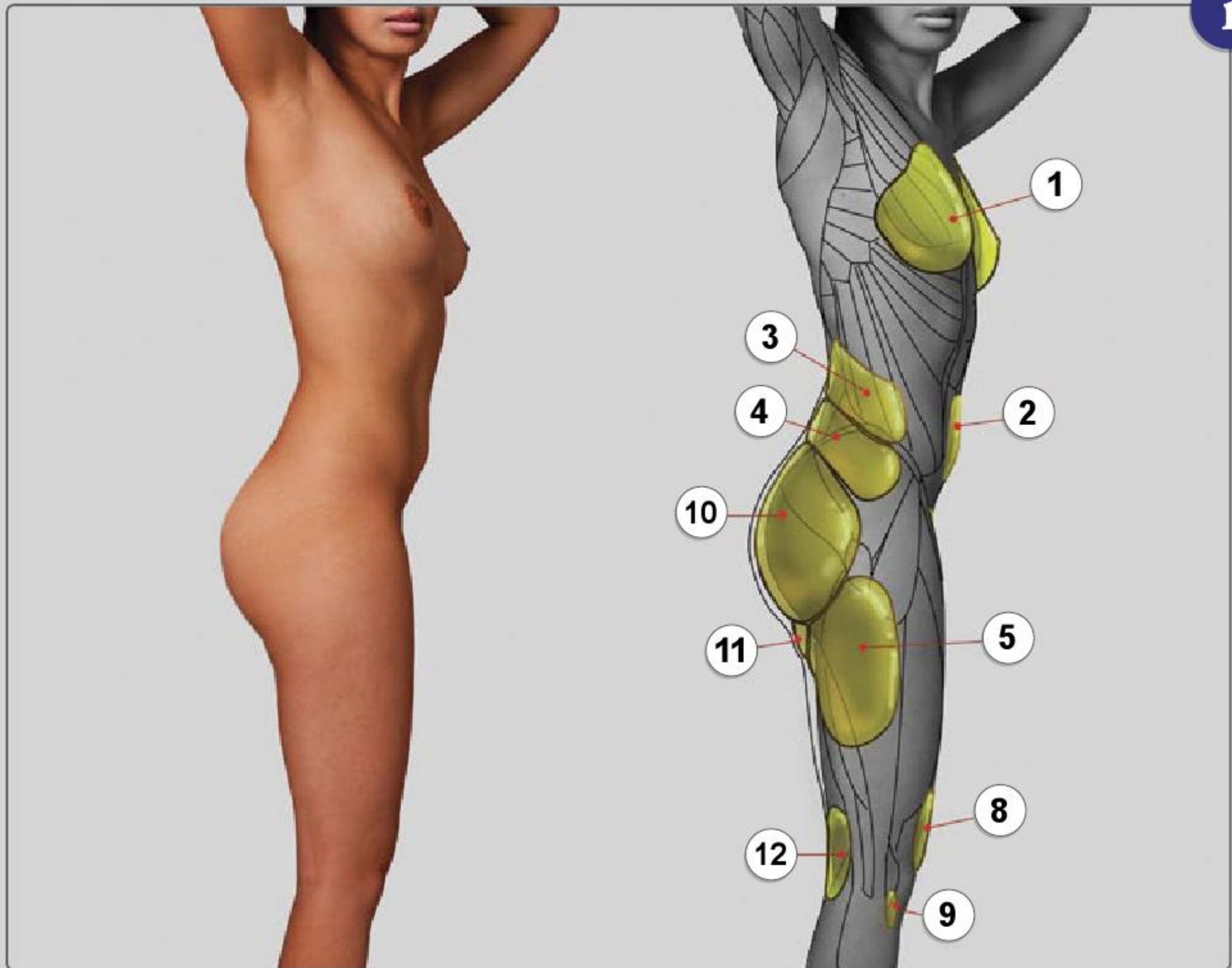


RIGHT KNEE

i



## FEMALE SUBCUTANEOUS FAT PADS (SIDE VIEW)



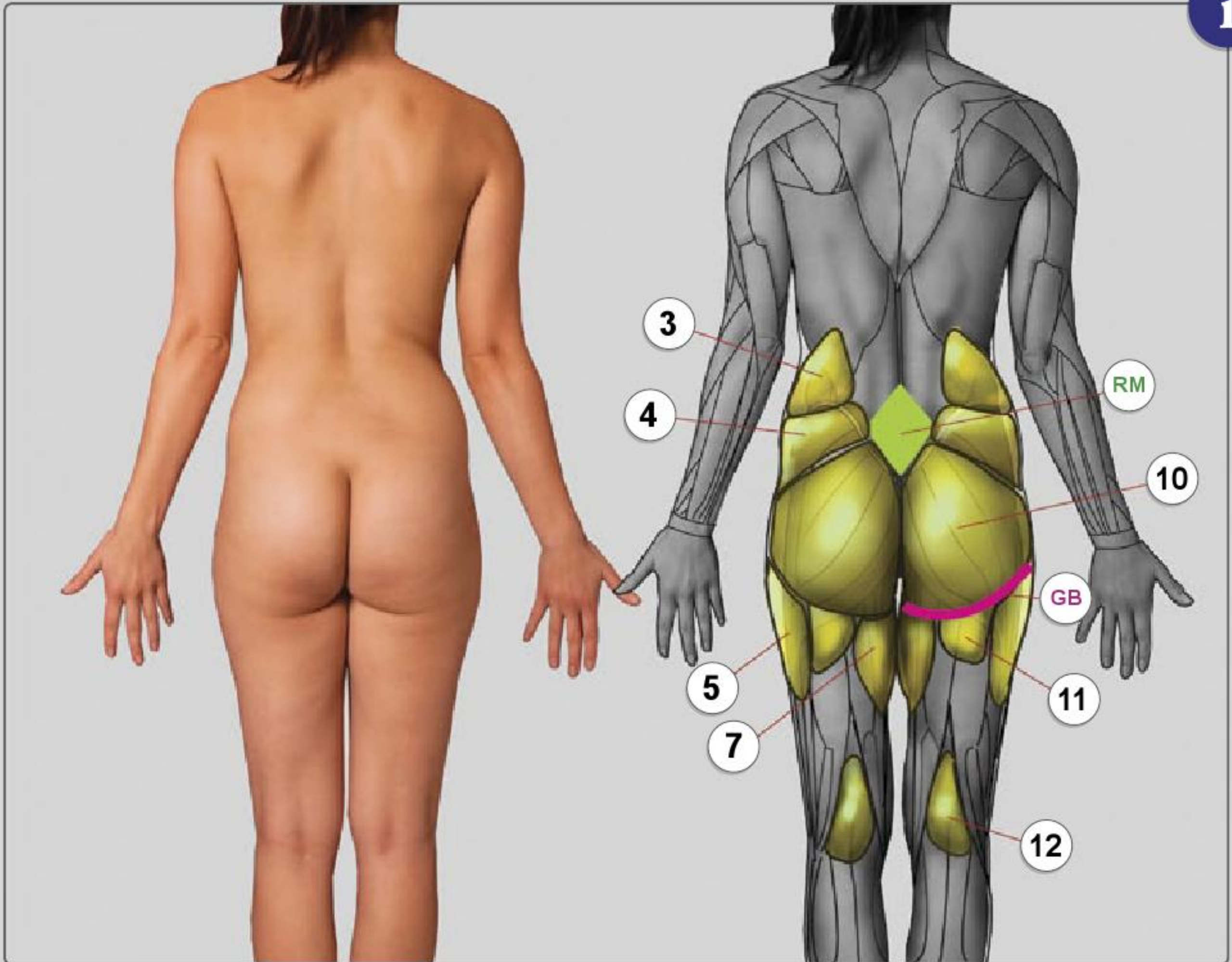
- |                           |                                |                                   |
|---------------------------|--------------------------------|-----------------------------------|
| 1 BREAST FAT              | 5 OUTER THIGH FAT PAD          | 11 INFERIOR GLUTEAL FAT EXTENSION |
| 2 ABDOMINAL FAT PAD       | 8 LOWER ANTERIOR THIGH FAT PAD |                                   |
| 3 FLANK FAT PAD           | 9 INFRAPATELLAR FAT PAD        | 12 POPLITEAL FAT PAD              |
| 4 LATERAL GLUTEAL FAT PAD | 10 POSTERIOR GLUTEAL FAT PAD   |                                   |





## FEMALE SUBCUTANEOUS FAT PADS (BACK VIEW)

i



- |                                  |                                  |                                                                                                      |
|----------------------------------|----------------------------------|------------------------------------------------------------------------------------------------------|
| <b>3</b> FLANK FAT PAD           | <b>5</b> OUTER THIGH FAT PAD     | <b>10</b> POSTERIOR GLUTEAL FAT PAD                                                                  |
| <b>4</b> LATERAL GLUTEAL FAT PAD | <b>7</b> INNER THIGH FAT PAD     | <b>11</b> INFERIOR GLUTEAL FAT EXTENSION                                                             |
| <b>12</b> POPLITEAL FAT PAD      | <b>RM</b> "RHOMBUS OF MICHAELIS" | <b>GB</b> <b>GLUTEAL BAND</b> – CREATES SKIN FOLD. WHEN THE THIGH IS FLEXED, GLUTEAL FOLD DISAPPEARS |

FEMALES HAVE MORE AND MUCH THICKER SUBCUTANEOUS FAT PADS THAN MALES. THIS IS WHY "TYPICAL FEMALE CURVES" APPEAR.



WHEN THE LEG IS STRAIGHT, POPLITEAL FAT PAD POPS OUT!

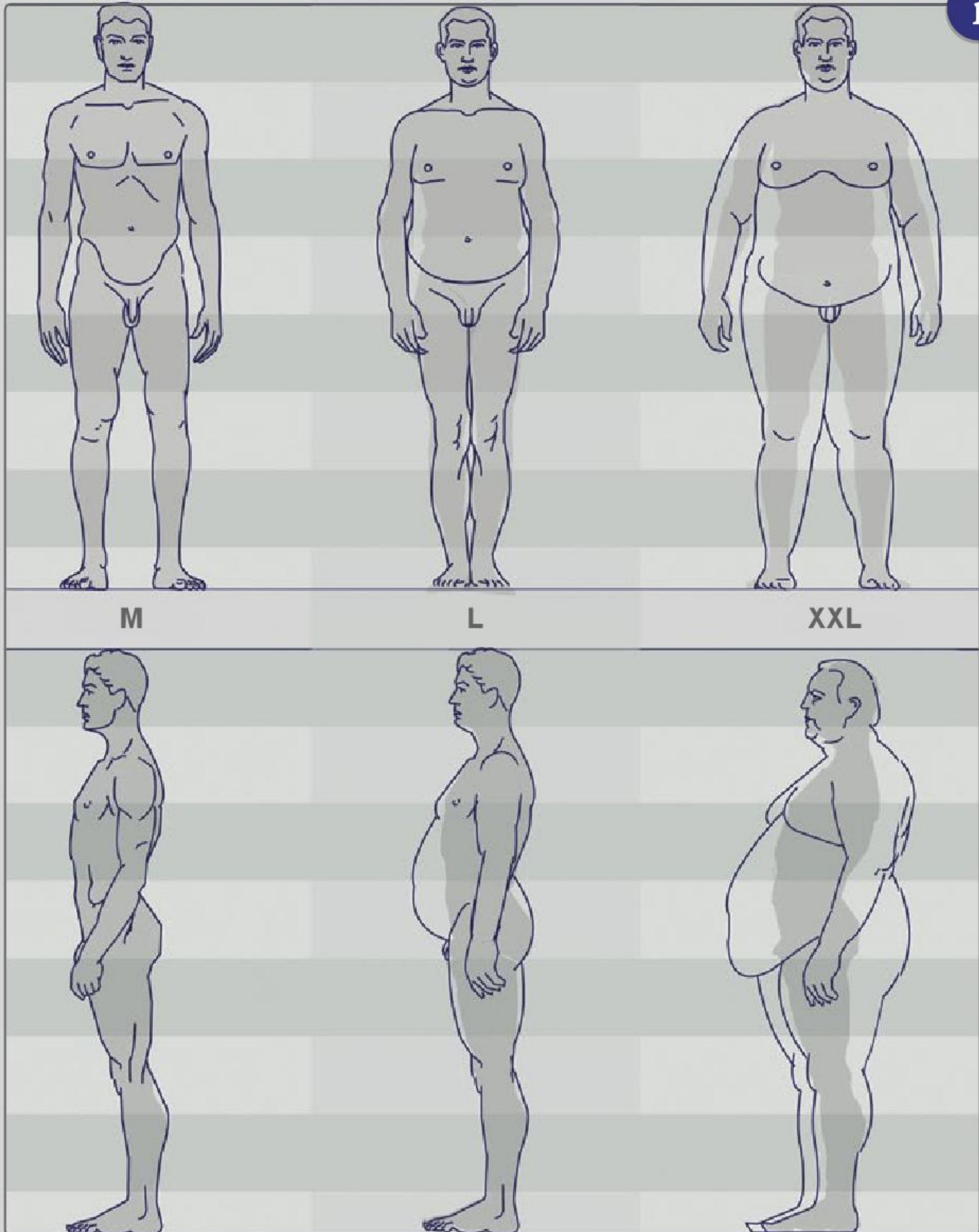
EXTREMELY FATLESS (DRY) BODY CASE.





## PROPORTIONAL CHANGES OF AN OBESE MALE: 7.5 HEAD UNITS

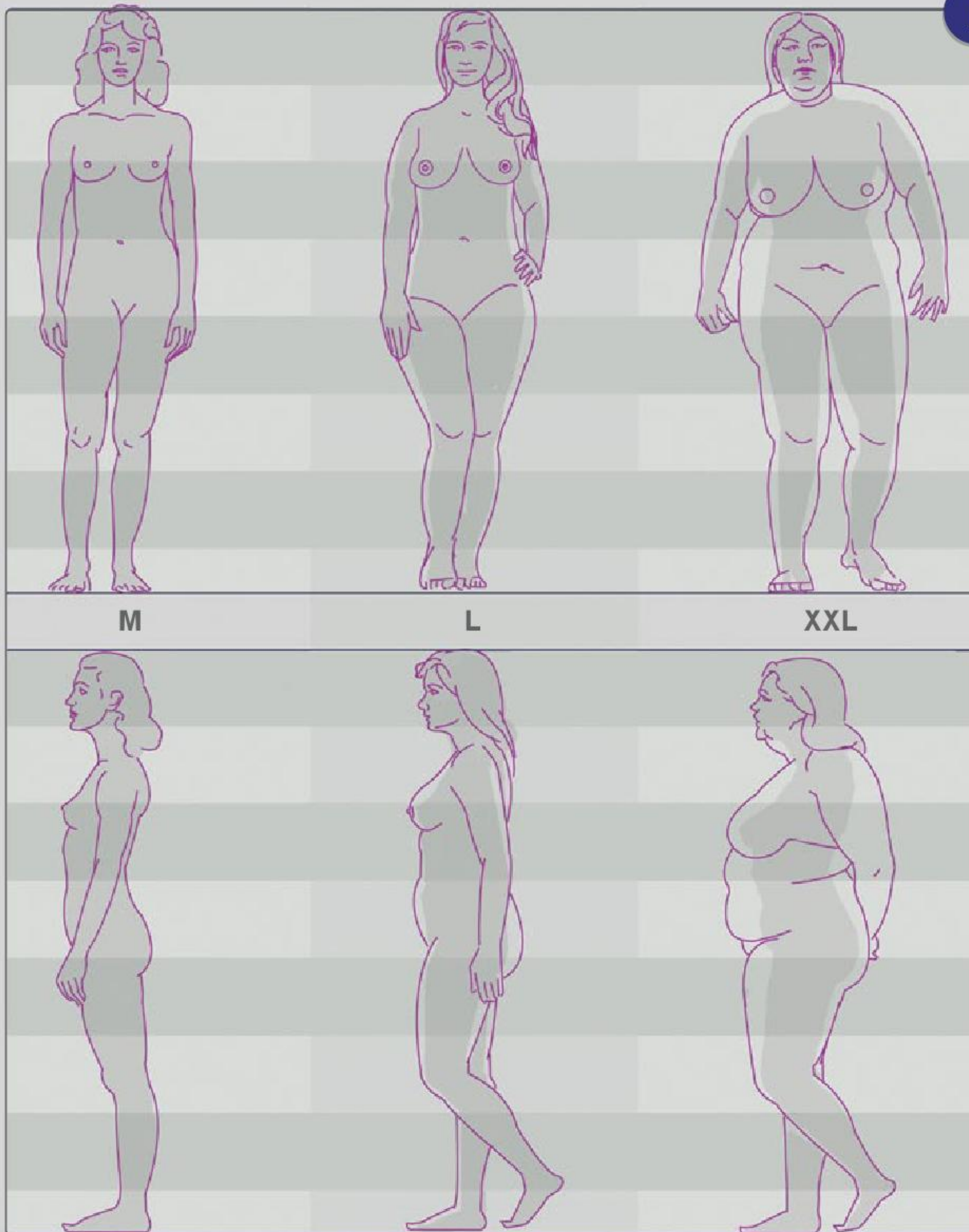
i





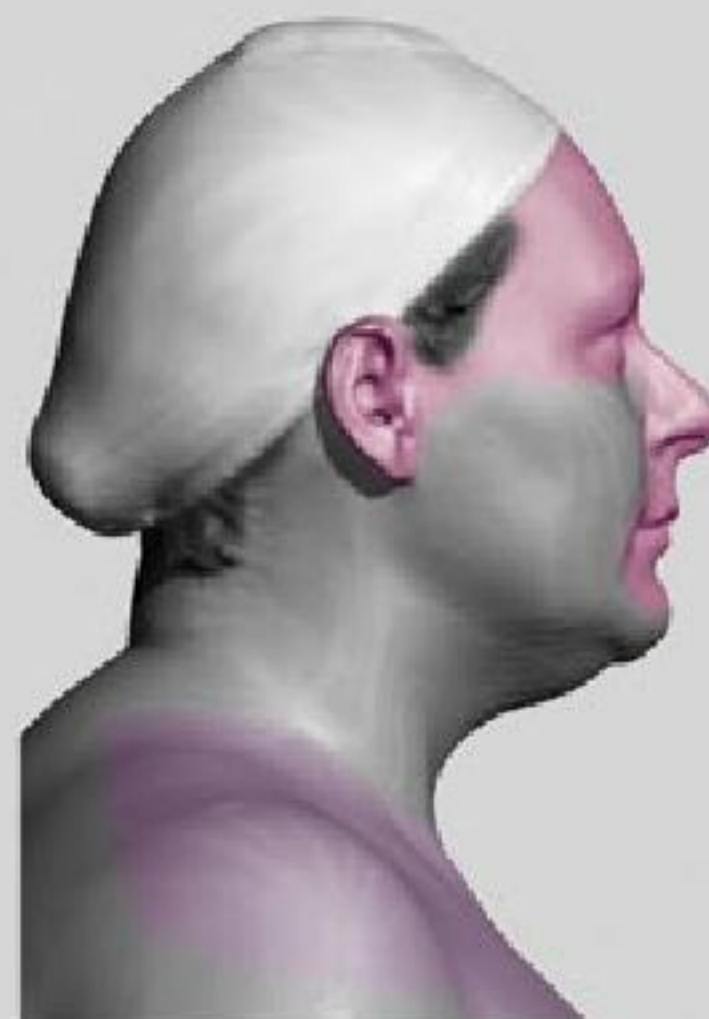
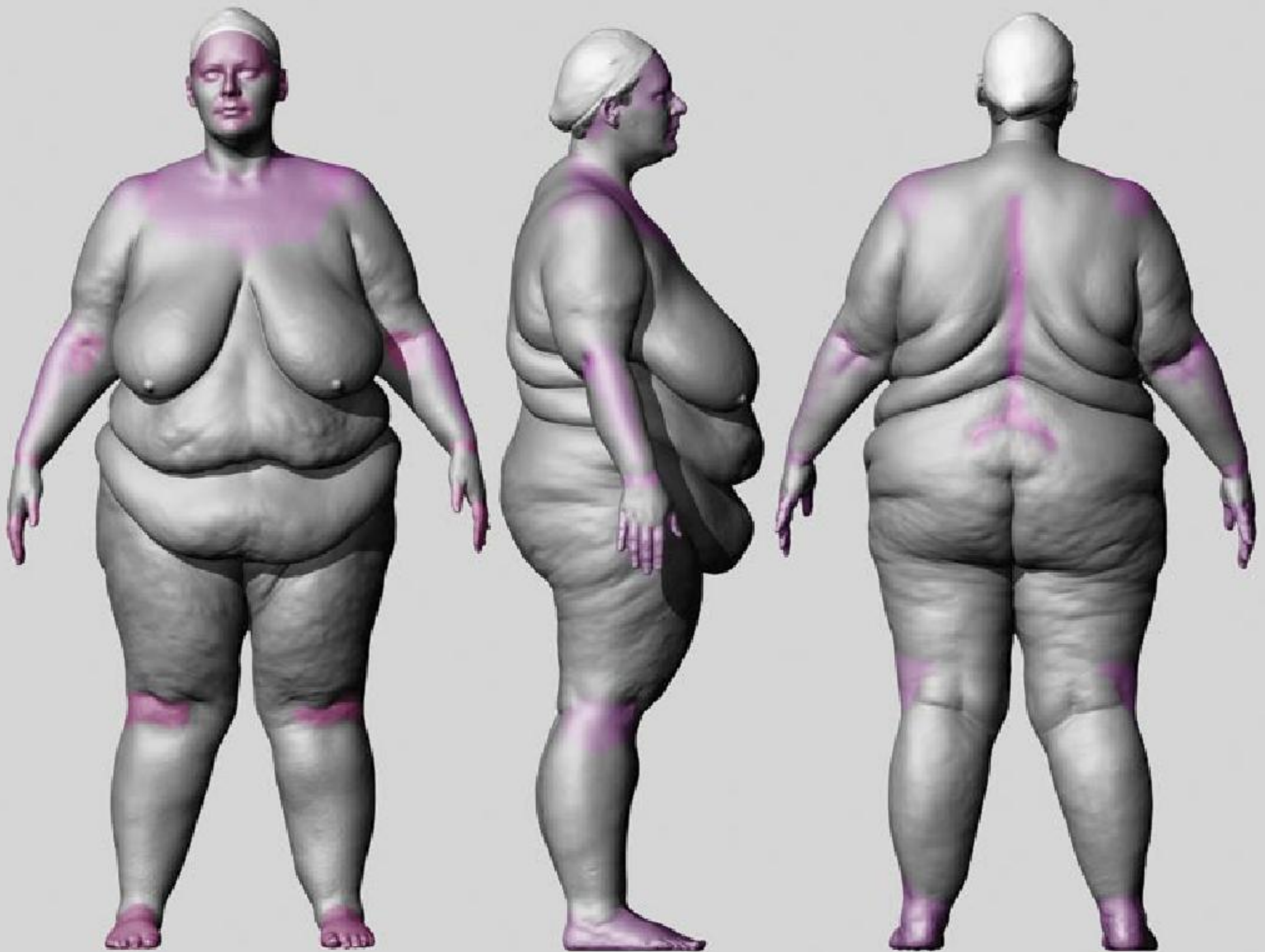
## PROPORTIONAL CHANGES OF AN OBESE FEMALE: 7.5 HEAD UNITS

i



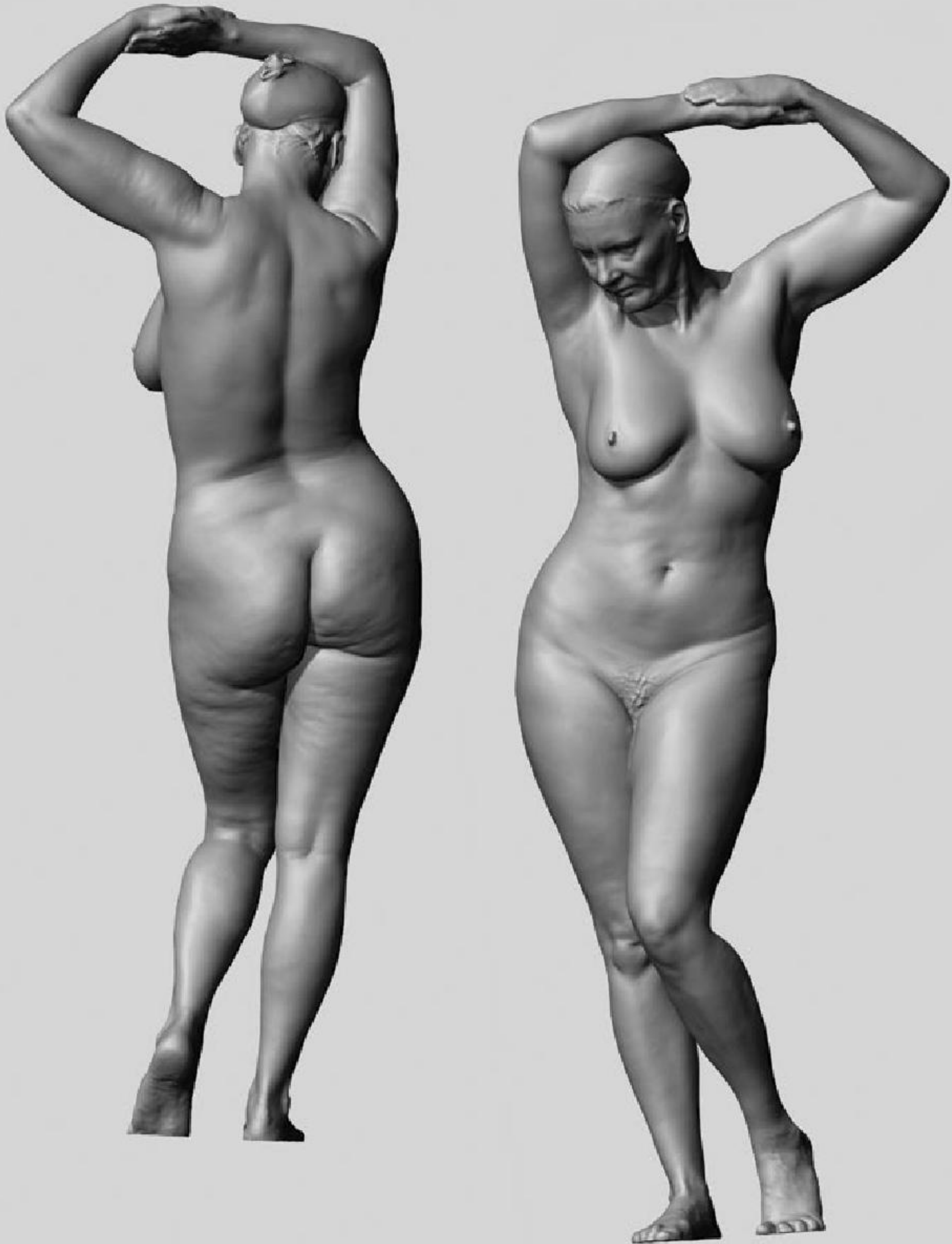


## AREAS OF THE BODY THAT ARE LESS AFFECTED BY FAT ACCUMULATION





## 3D SCAN OF MIDDLE-AGED WOMAN



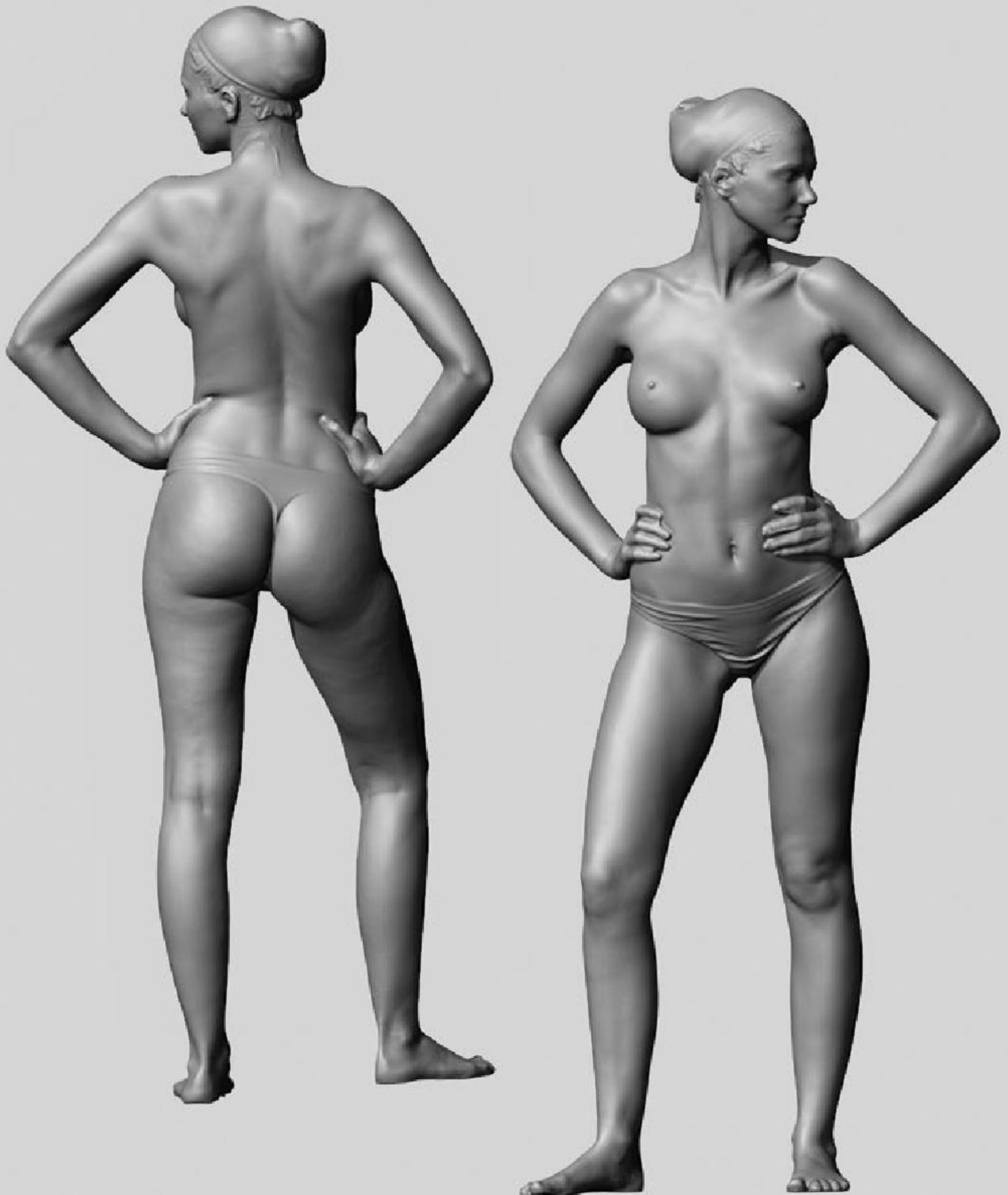


## 3D SCAN OF YOUNG FEMALE





## 3D SCAN OF YOUNG FEMALE





## 3D SCAN OF YOUNG MAN





## 3D SCAN OF MIDDLE-AGED MAN





## ARMS REACHING BEHIND BODY



3/4



RIGHT SIDE



3/4



FRONT



BACK



LEFT SIDE



## ARMS AT SIDES



3/4



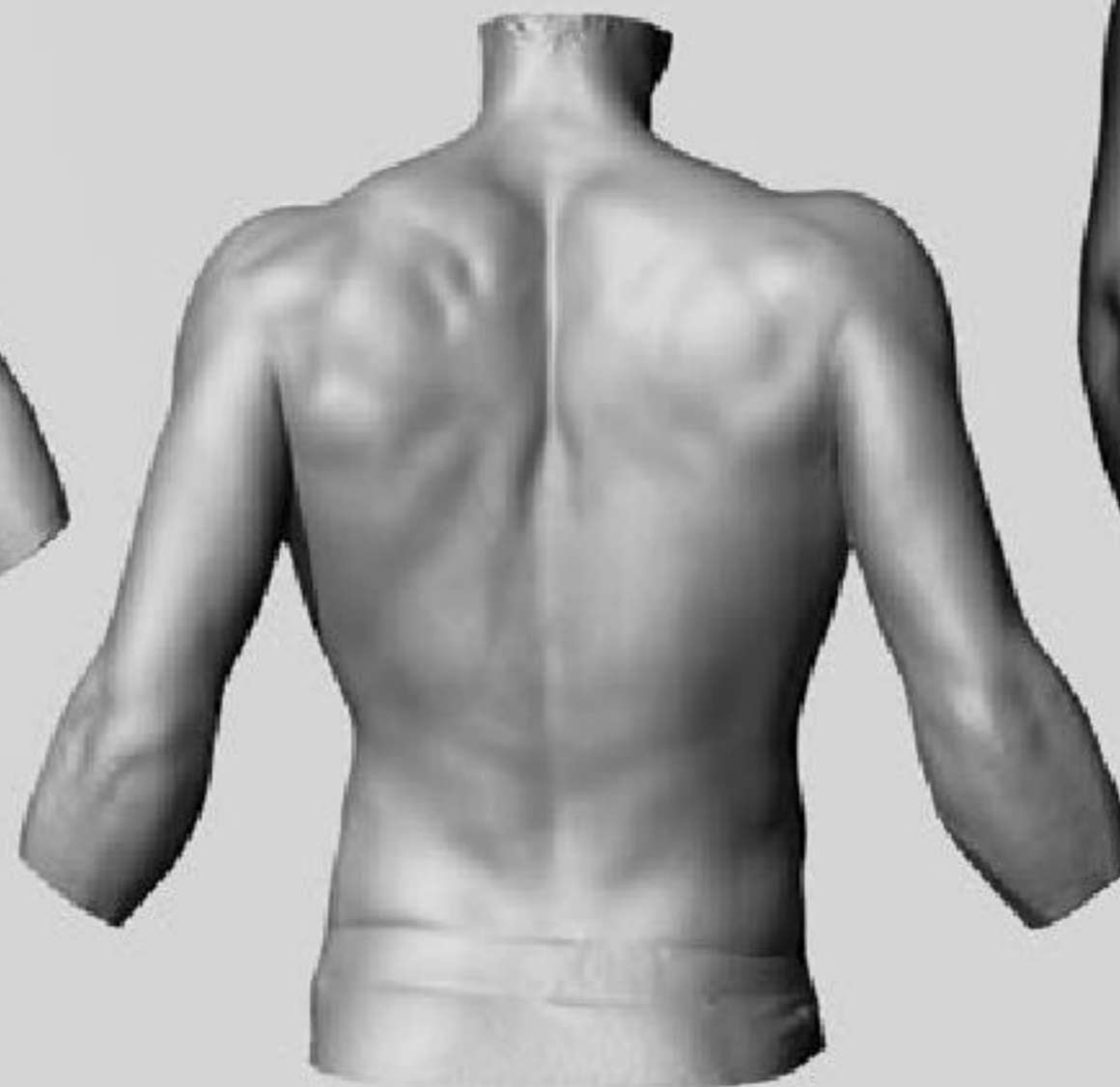
LEFT SIDE



3/4



FRONT



BACK



RIGHT SIDE



## ARMS HELD STRAIGHT OUT TO SIDES



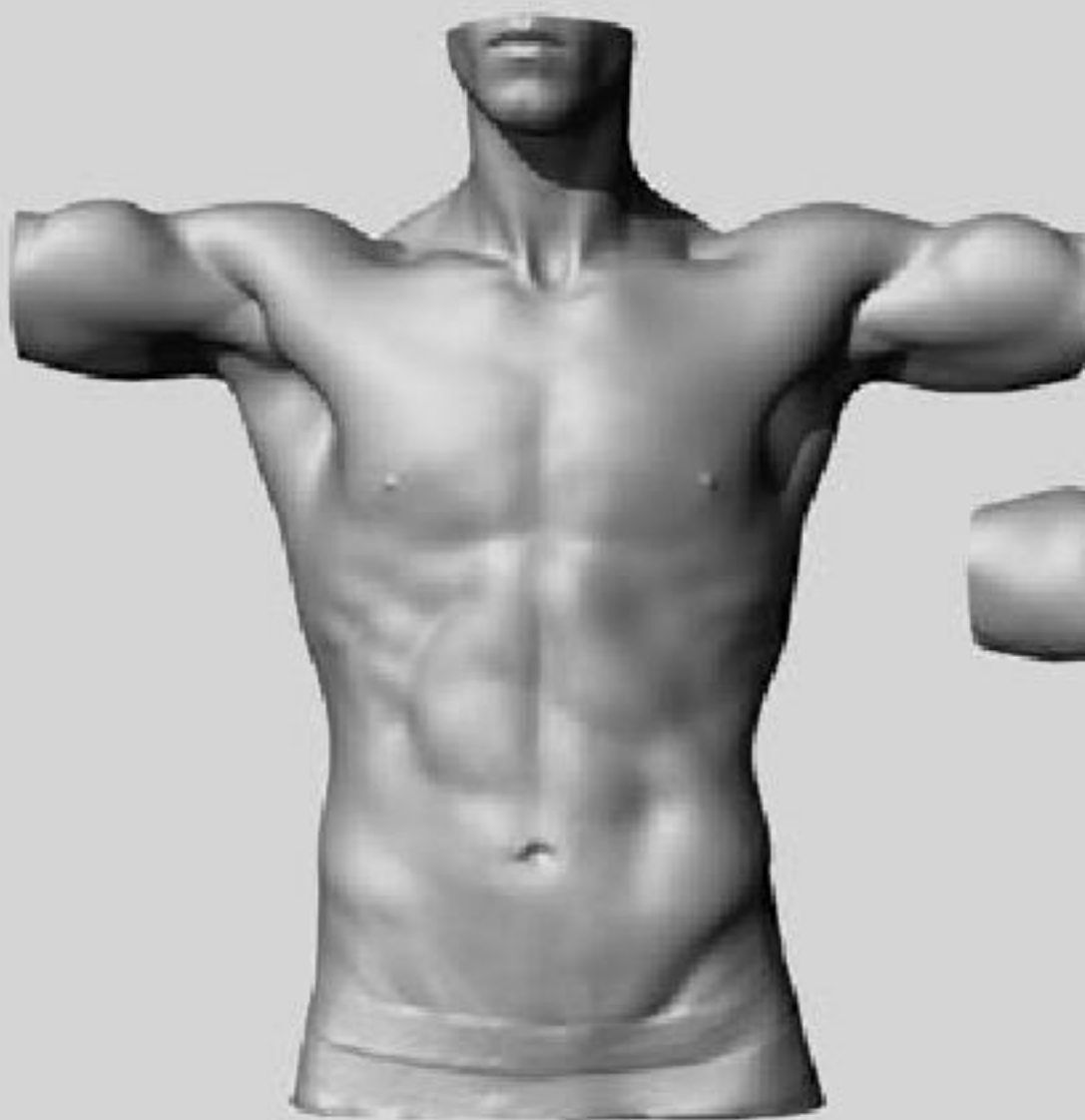
3/4



LEFT SIDE



3/4



FRONT



BACK



RIGHT SIDE



## ARMS IN A “Y” POSITION



3/4



LEFT SIDE



3/4



FRONT



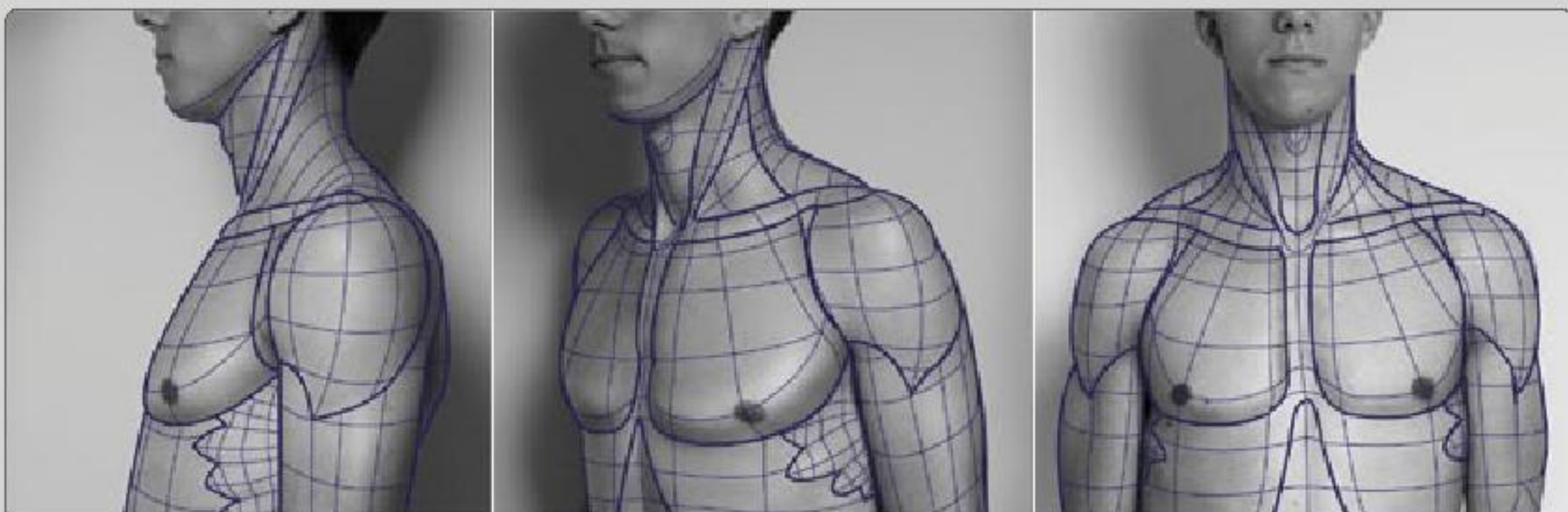
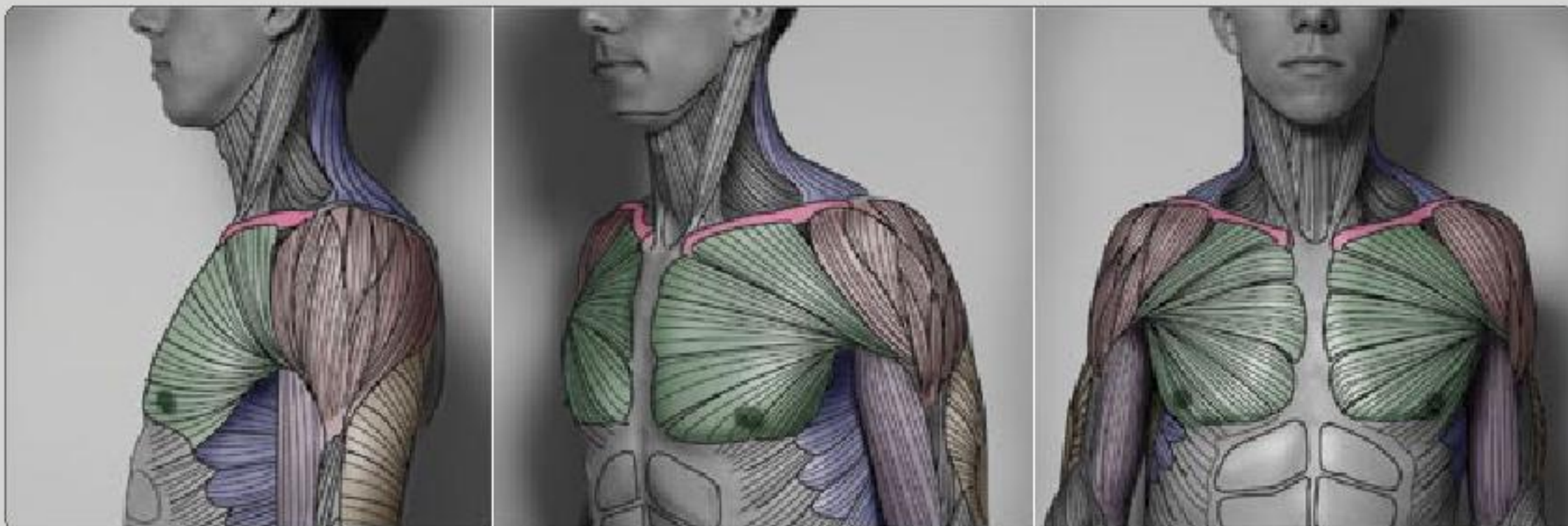
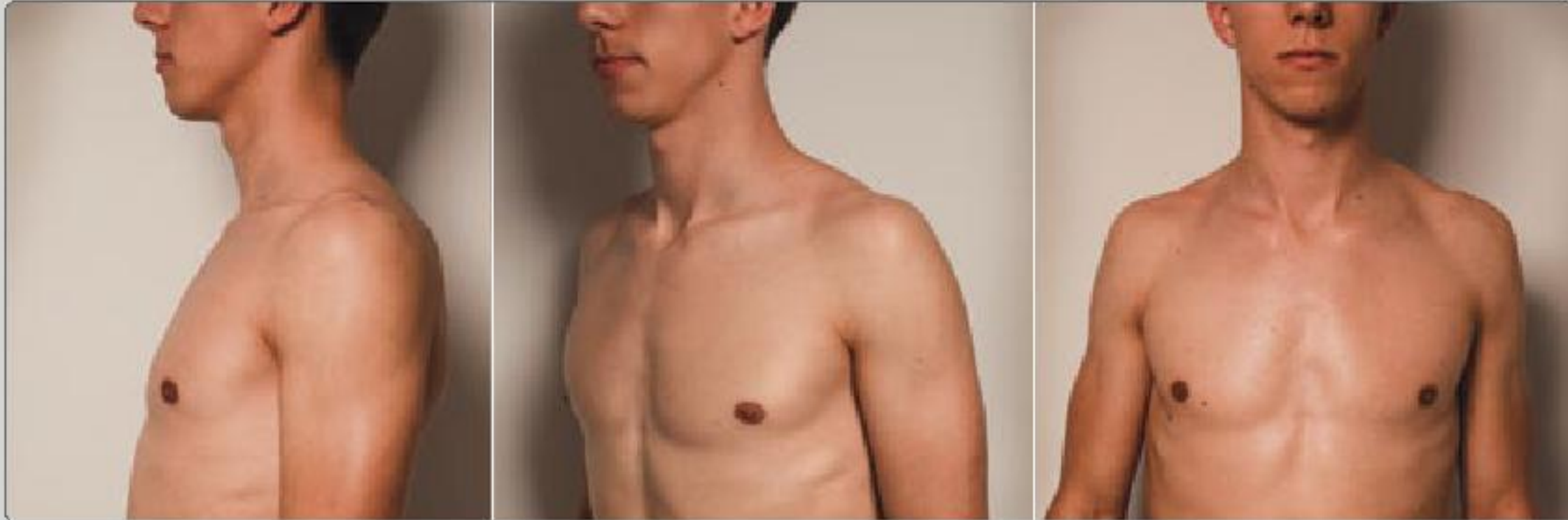
BACK



RIGHT SIDE

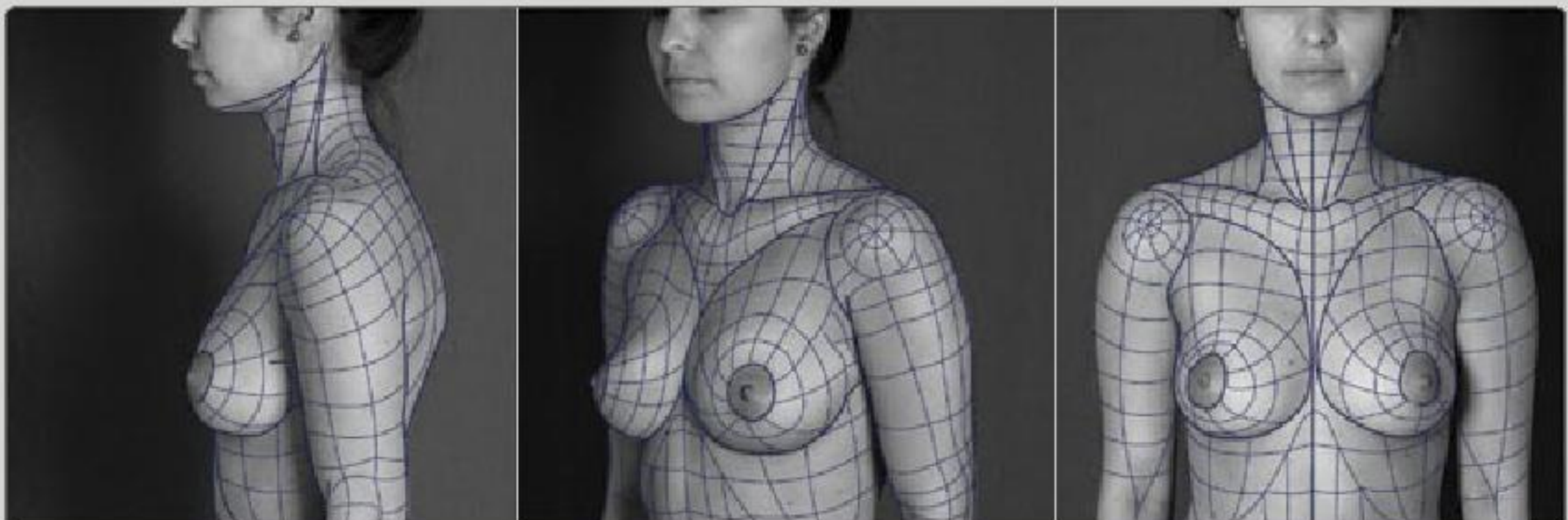
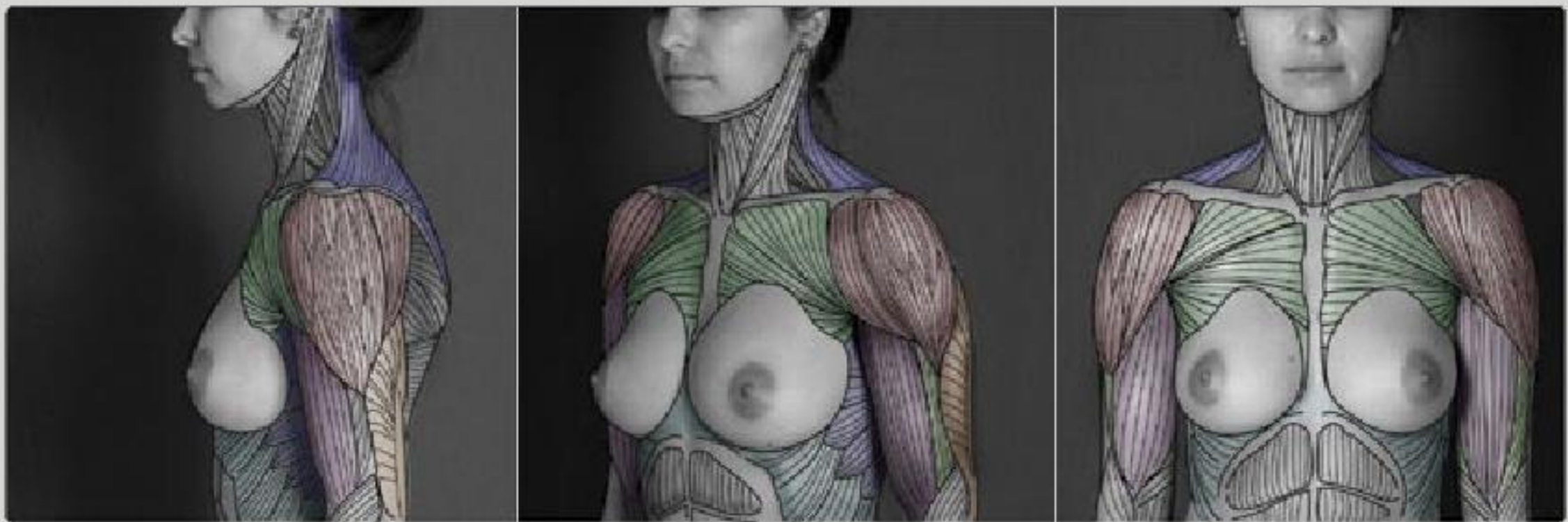


## ARMS HANGING NATURALLY – MALE



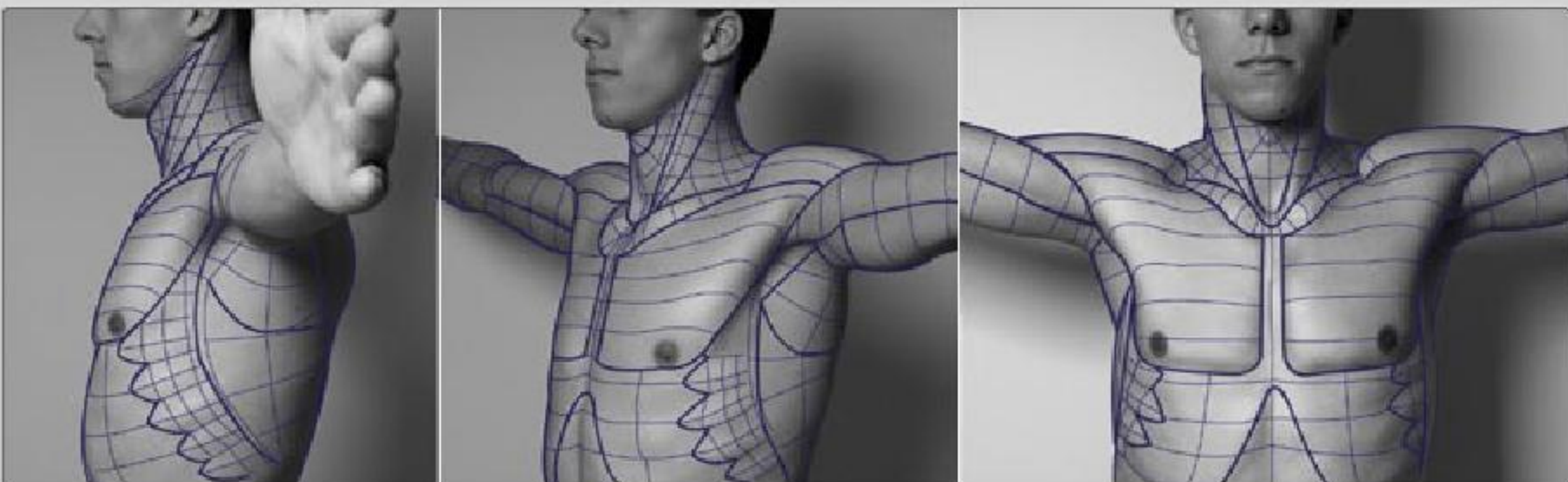
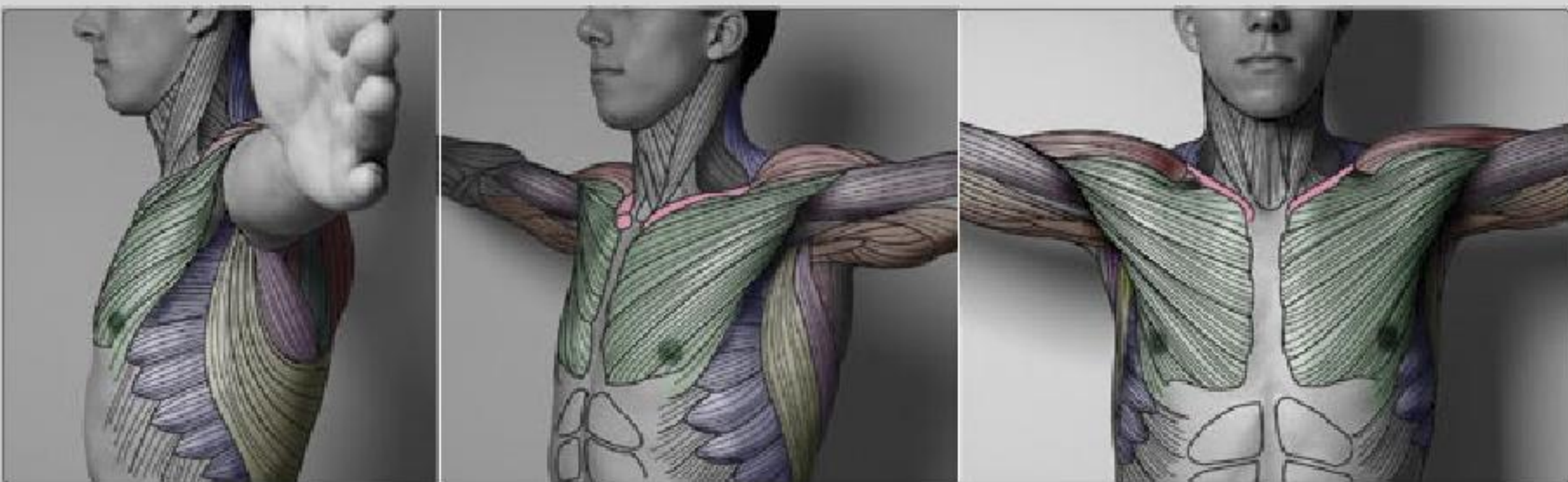
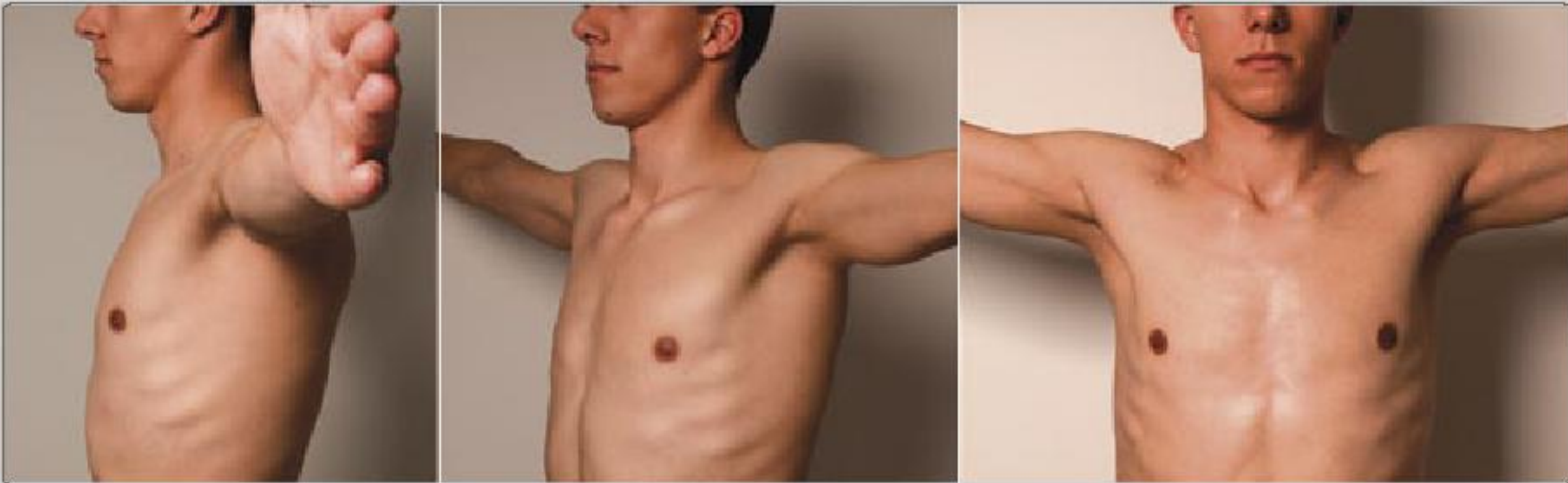


## ARMS HANGING NATURALLY – FEMALE



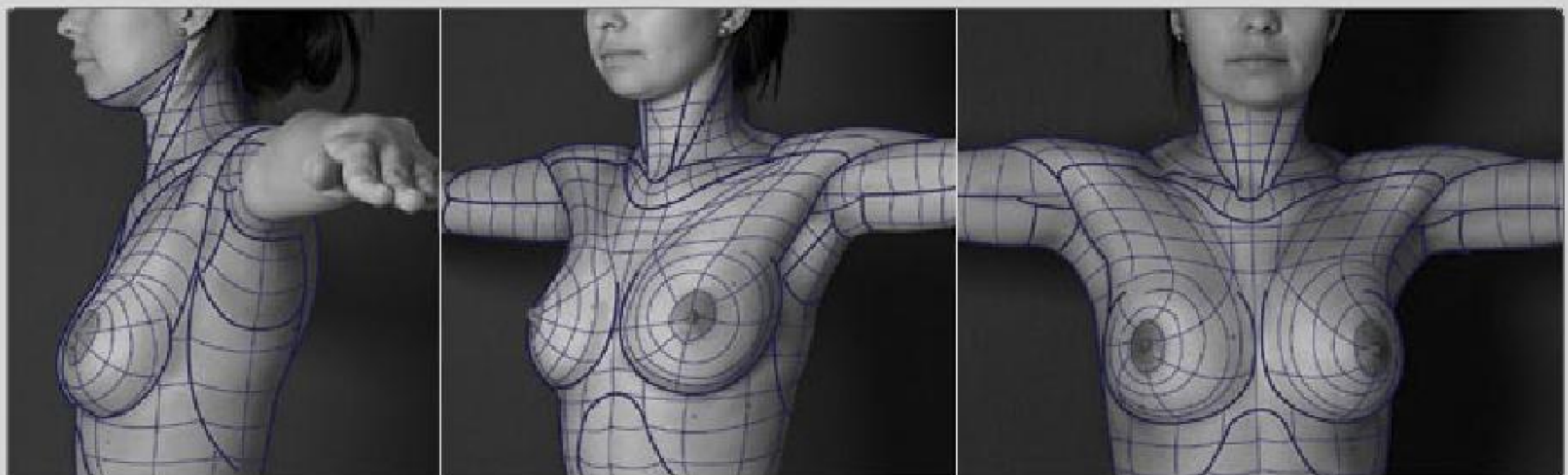
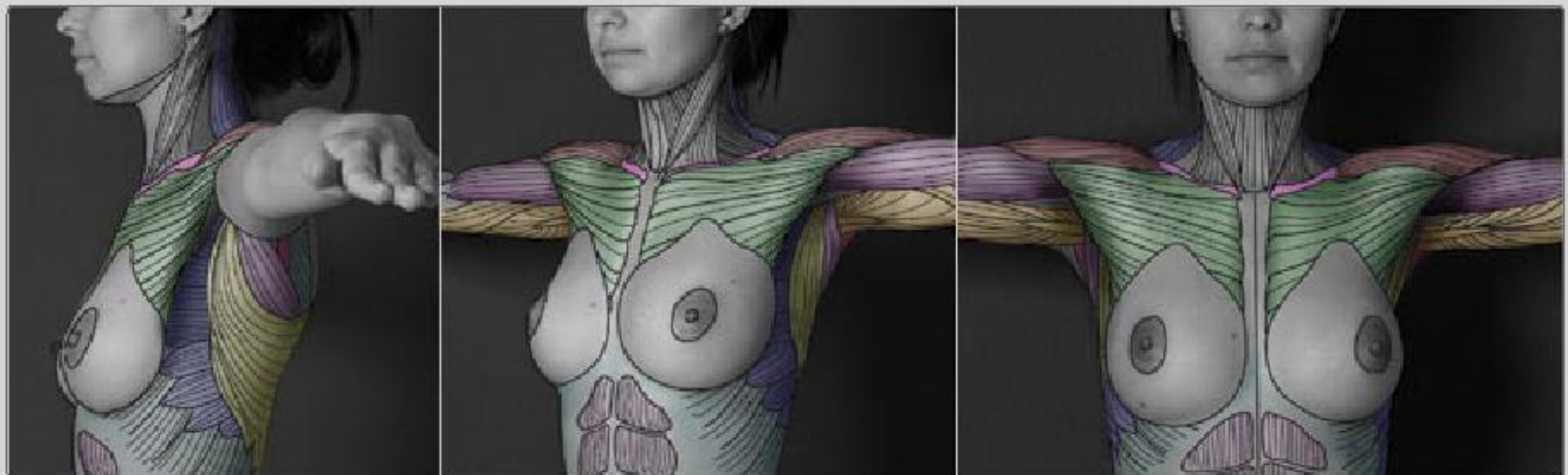
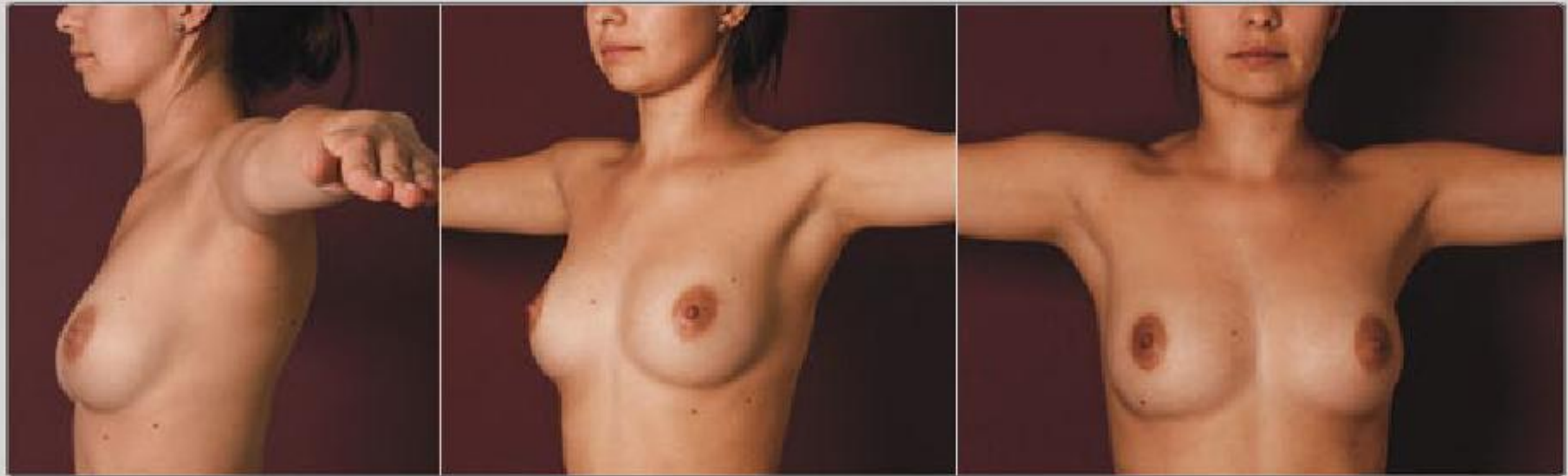


## ARMS HELD STRAIGHT OUT TO SIDES – MALE



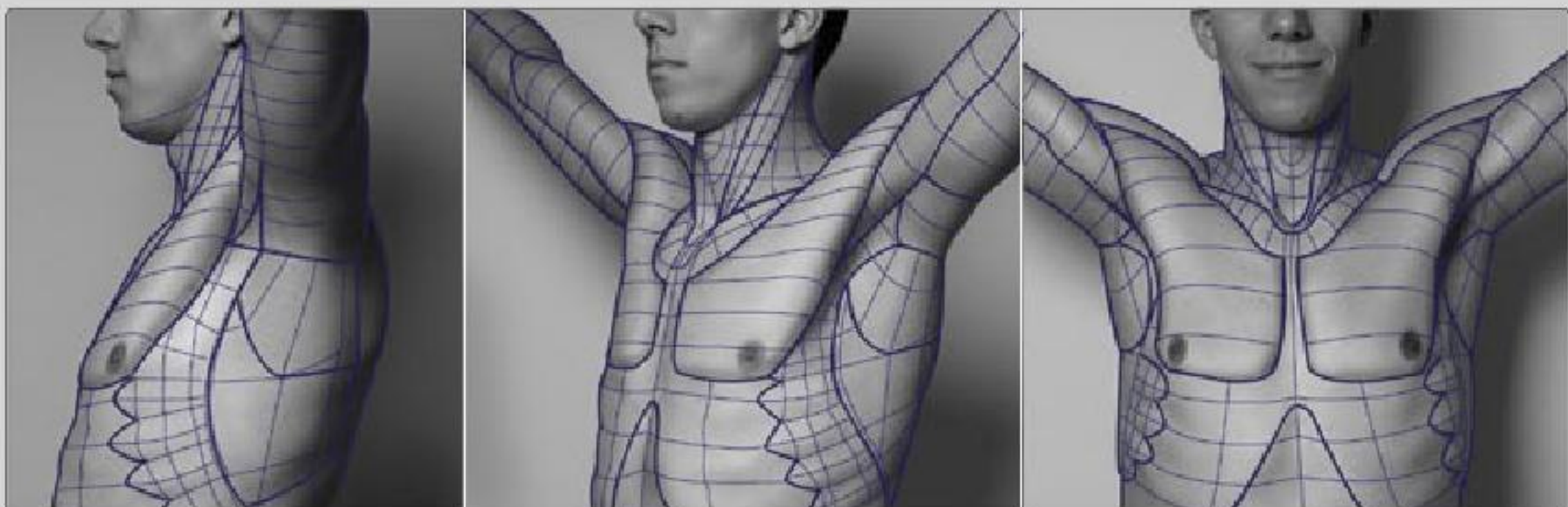
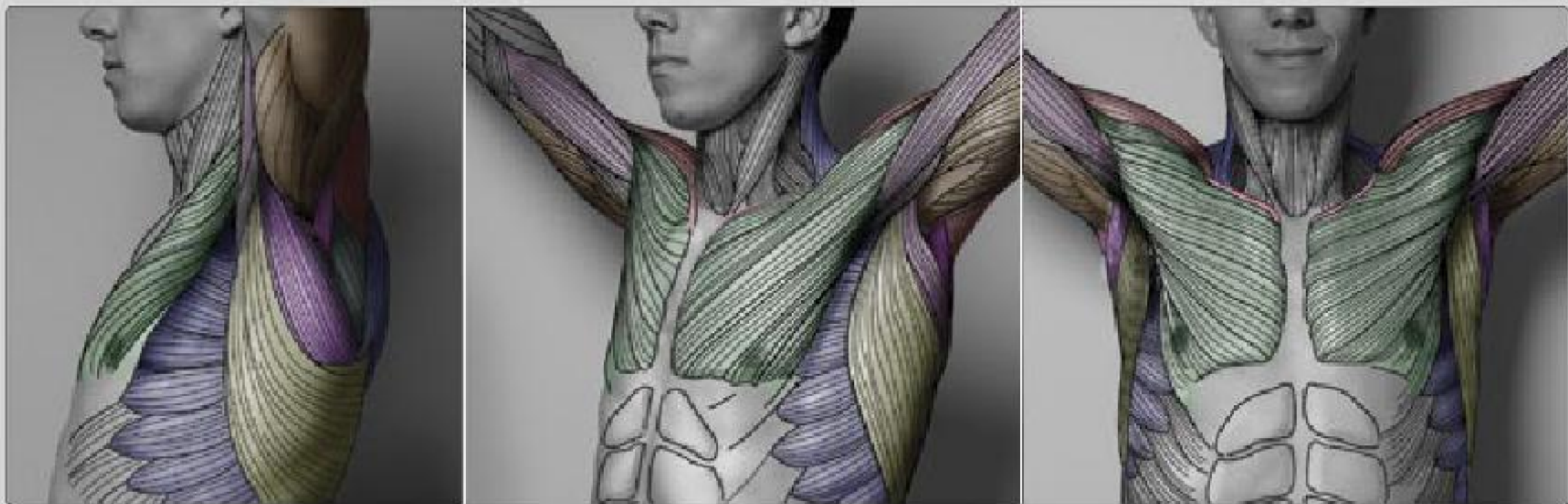


## ARMS HELD STRAIGHT OUT TO SIDES – FEMALE



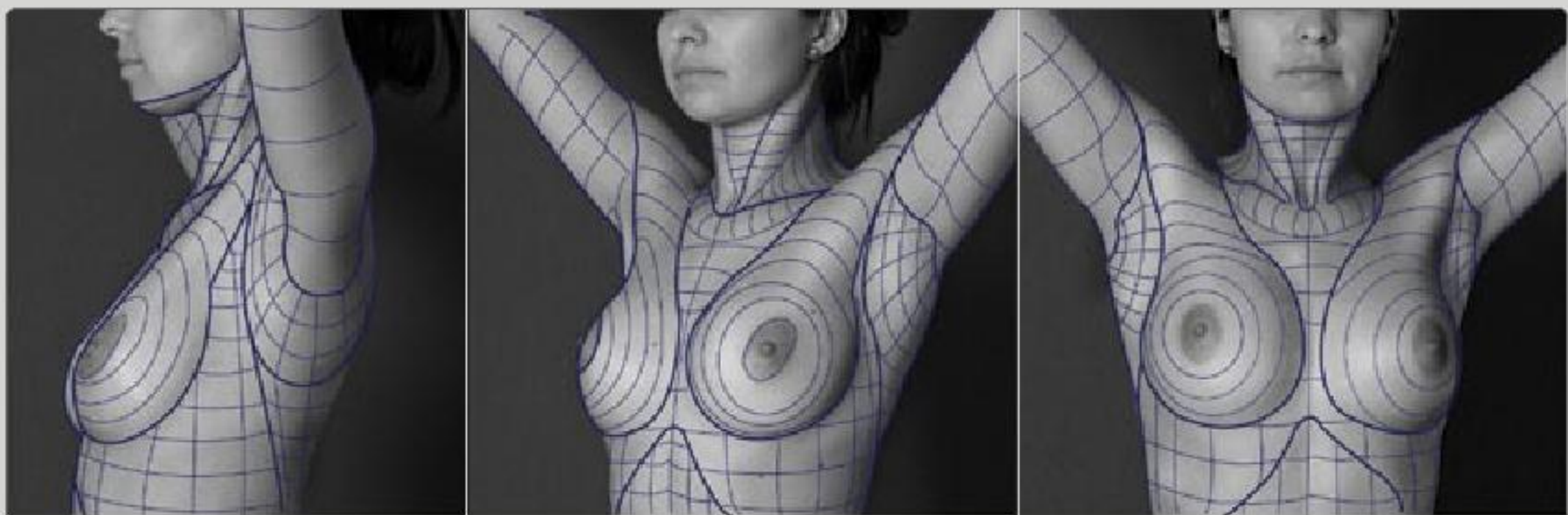
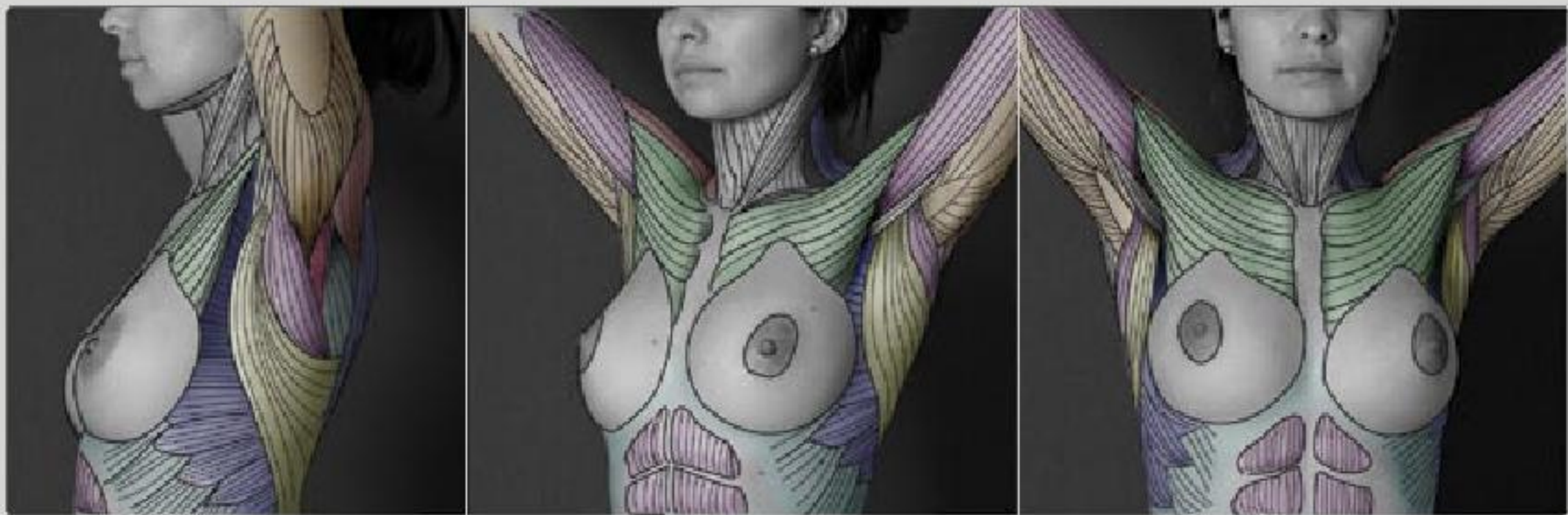


## ARMS IN A “Y” POSITION – MALE



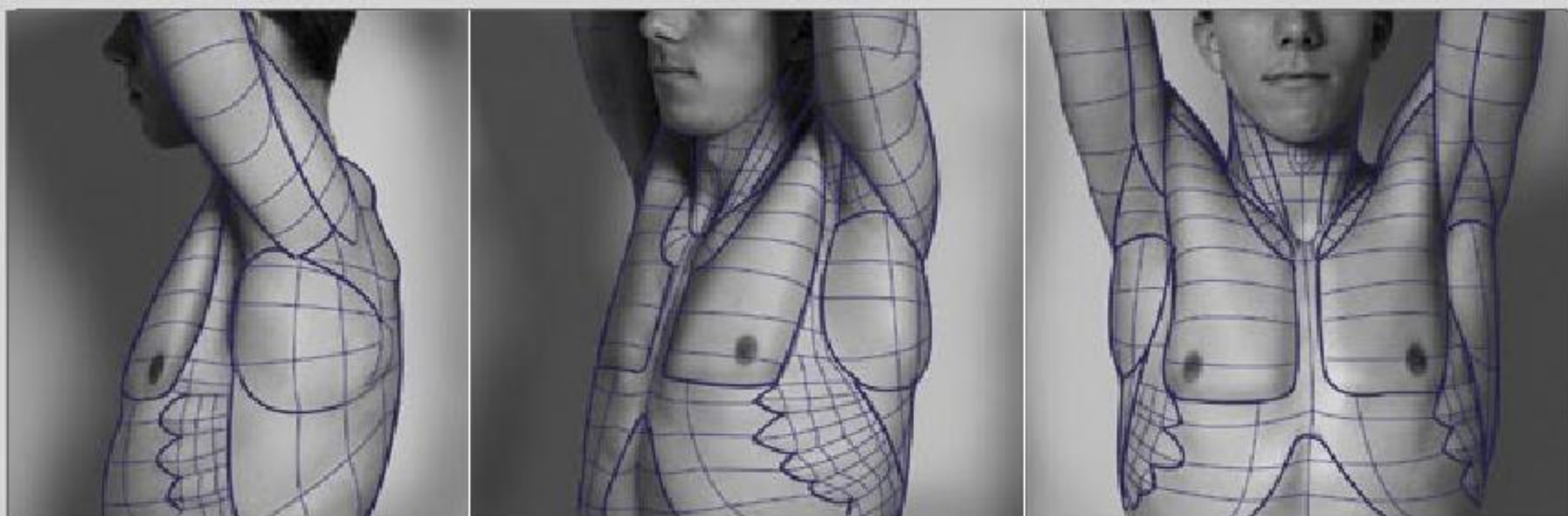


## ARMS IN A “Y” POSITION – FEMALE



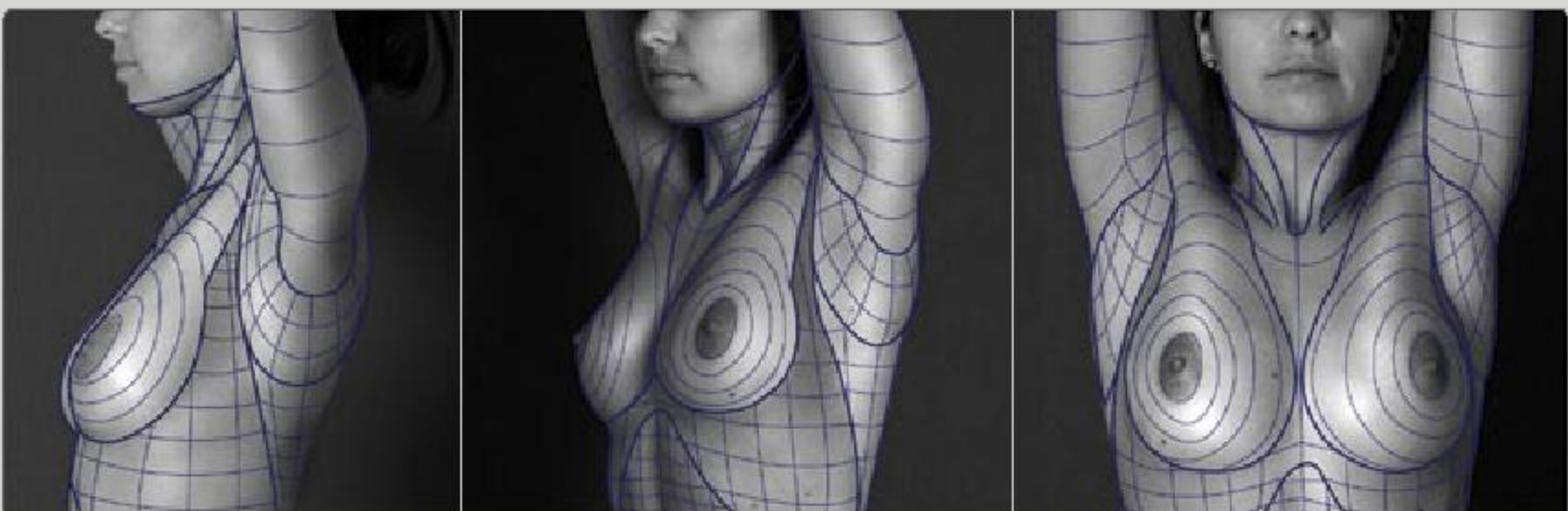
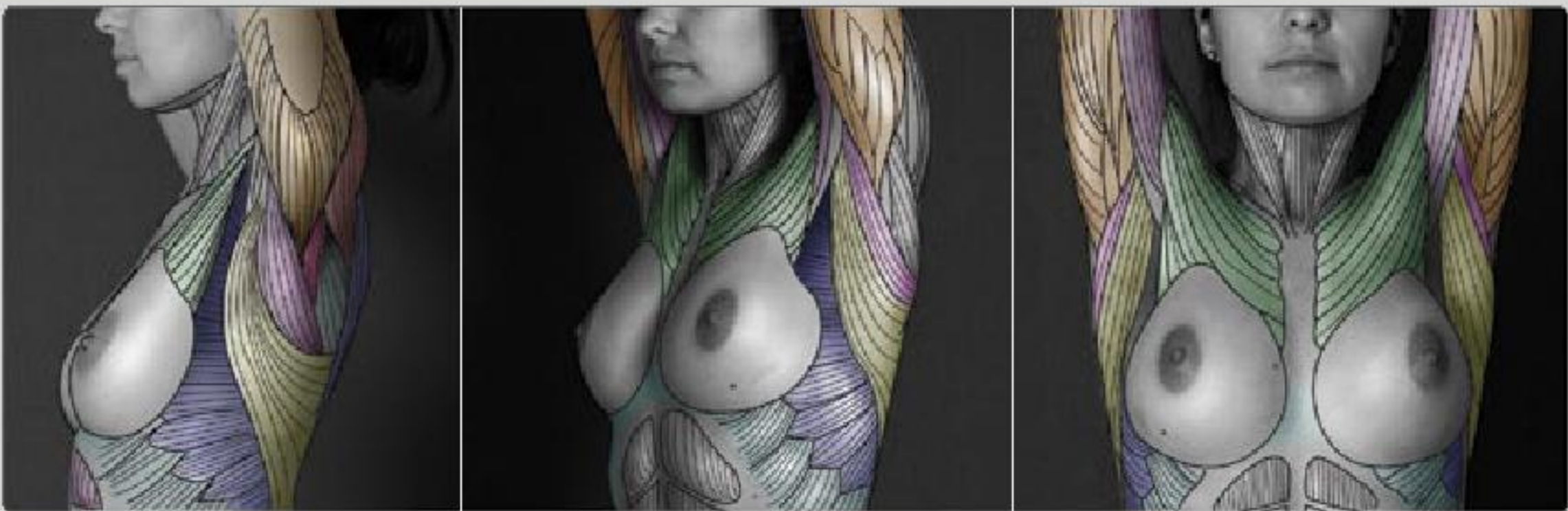


## ARMS STRAIGHT UP – MALE



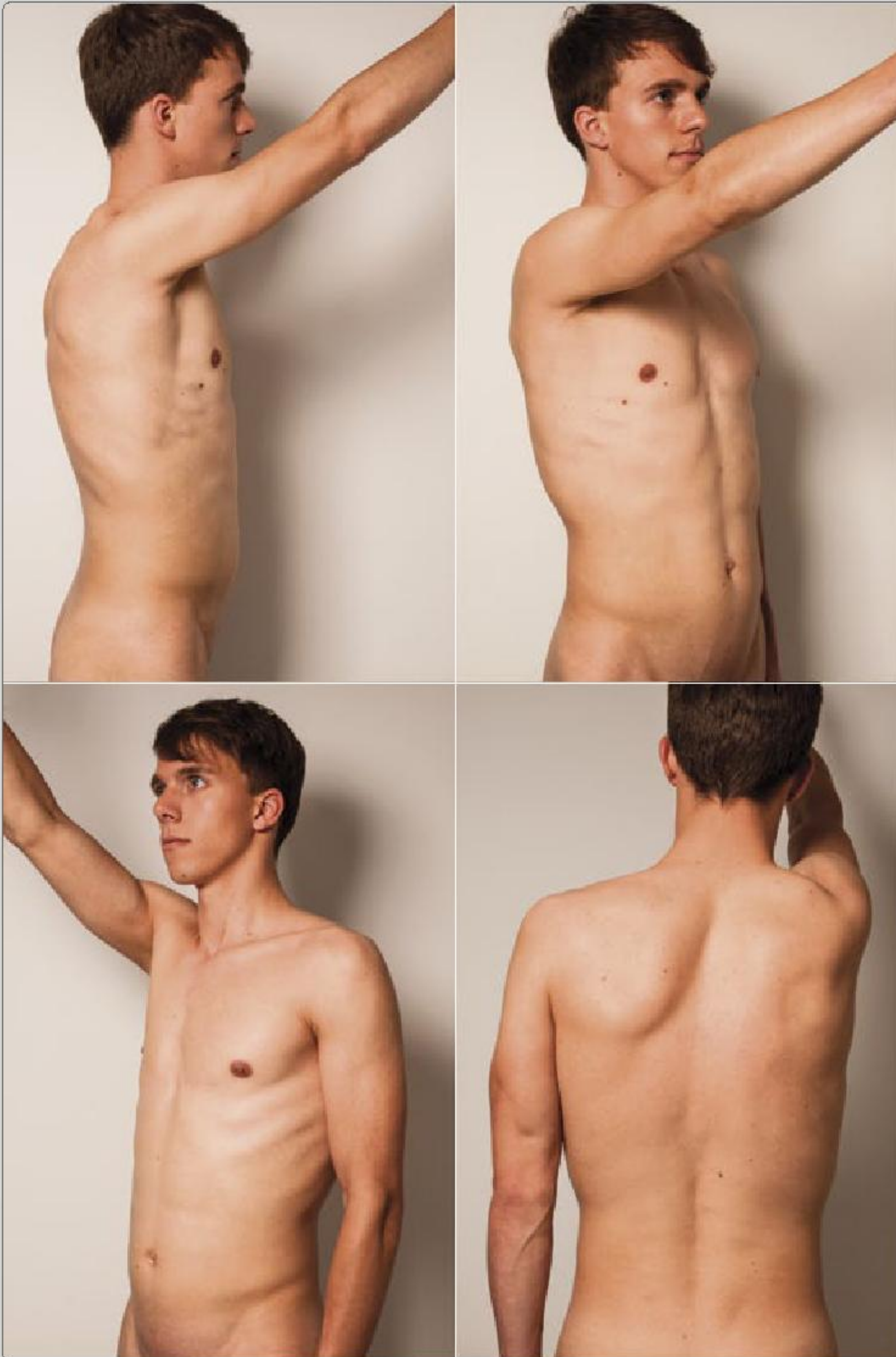


## ARMS STRAIGHT UP – FEMALE



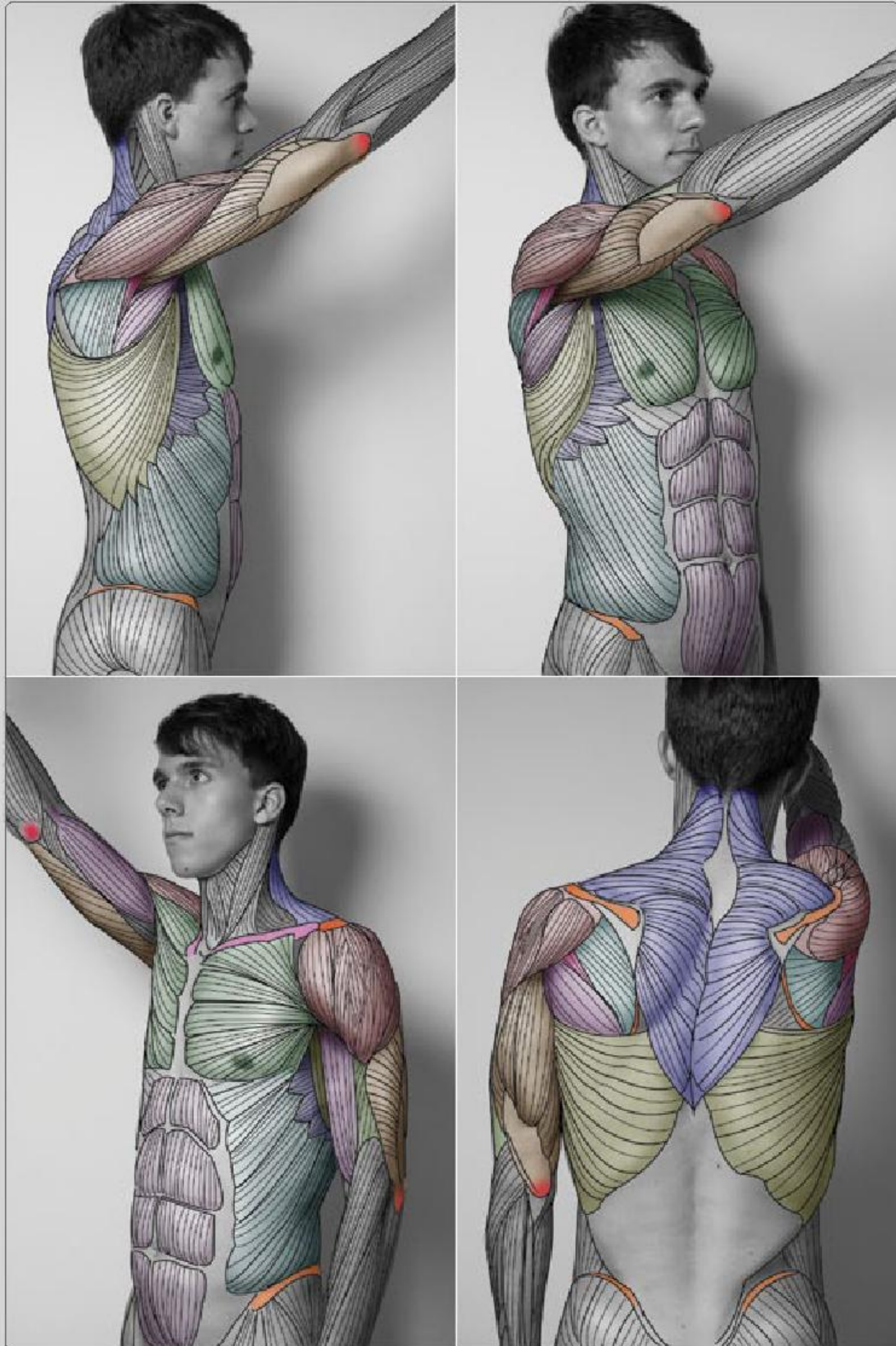


## ARM REACHING UP AND FORWARD



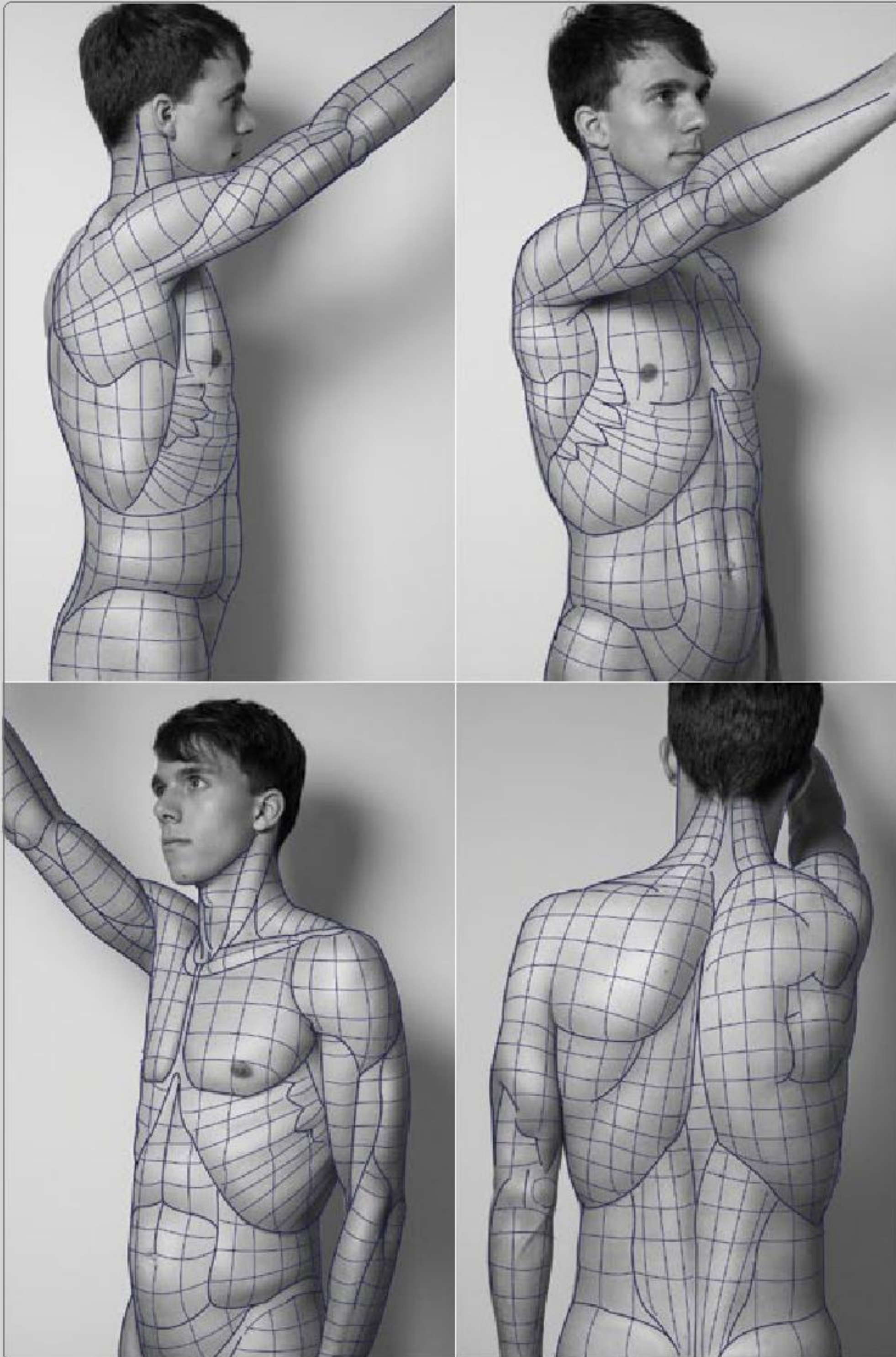


## ARM REACHING UP AND FORWARD



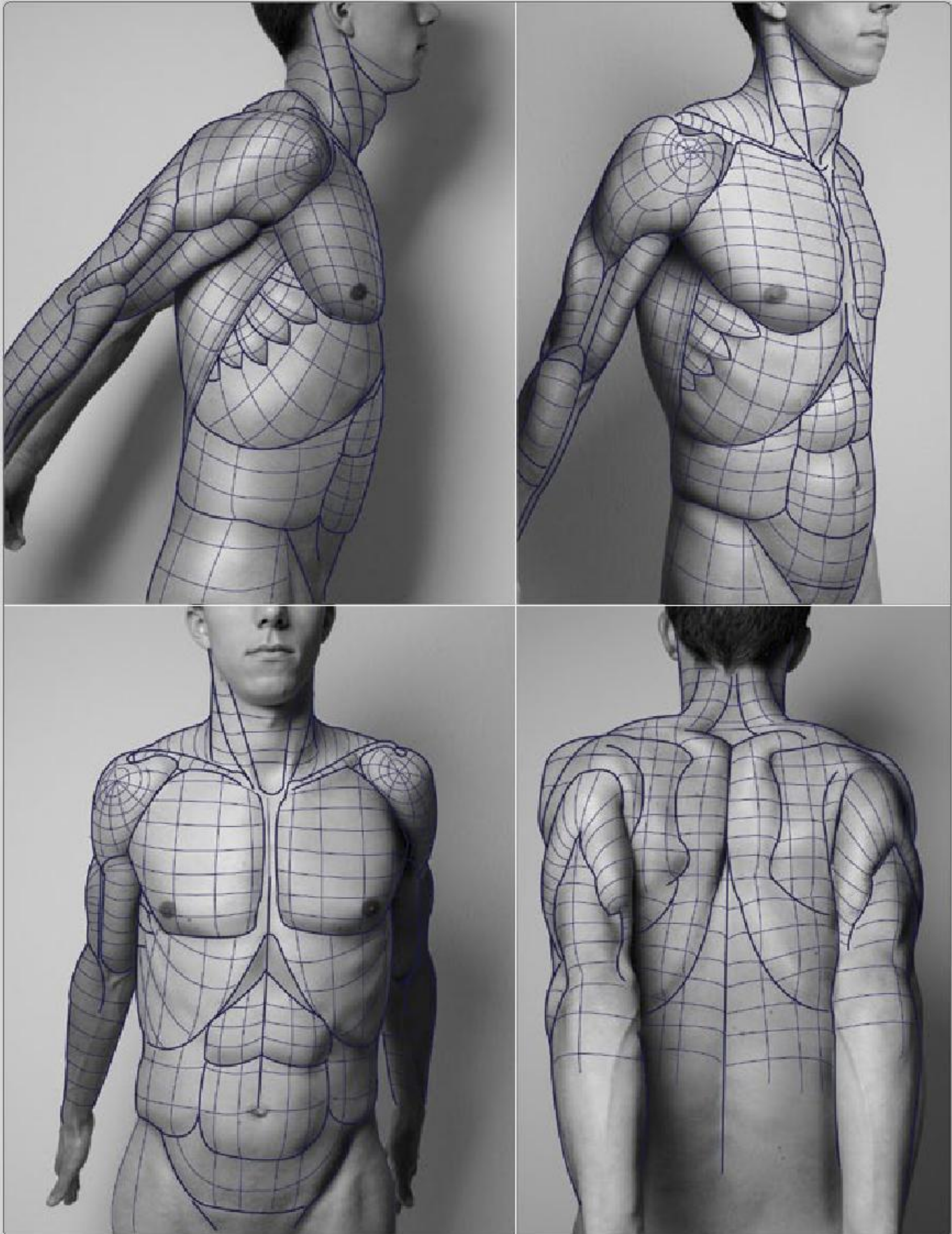


## ARM REACHING UP AND FORWARD





## REACHING BACK



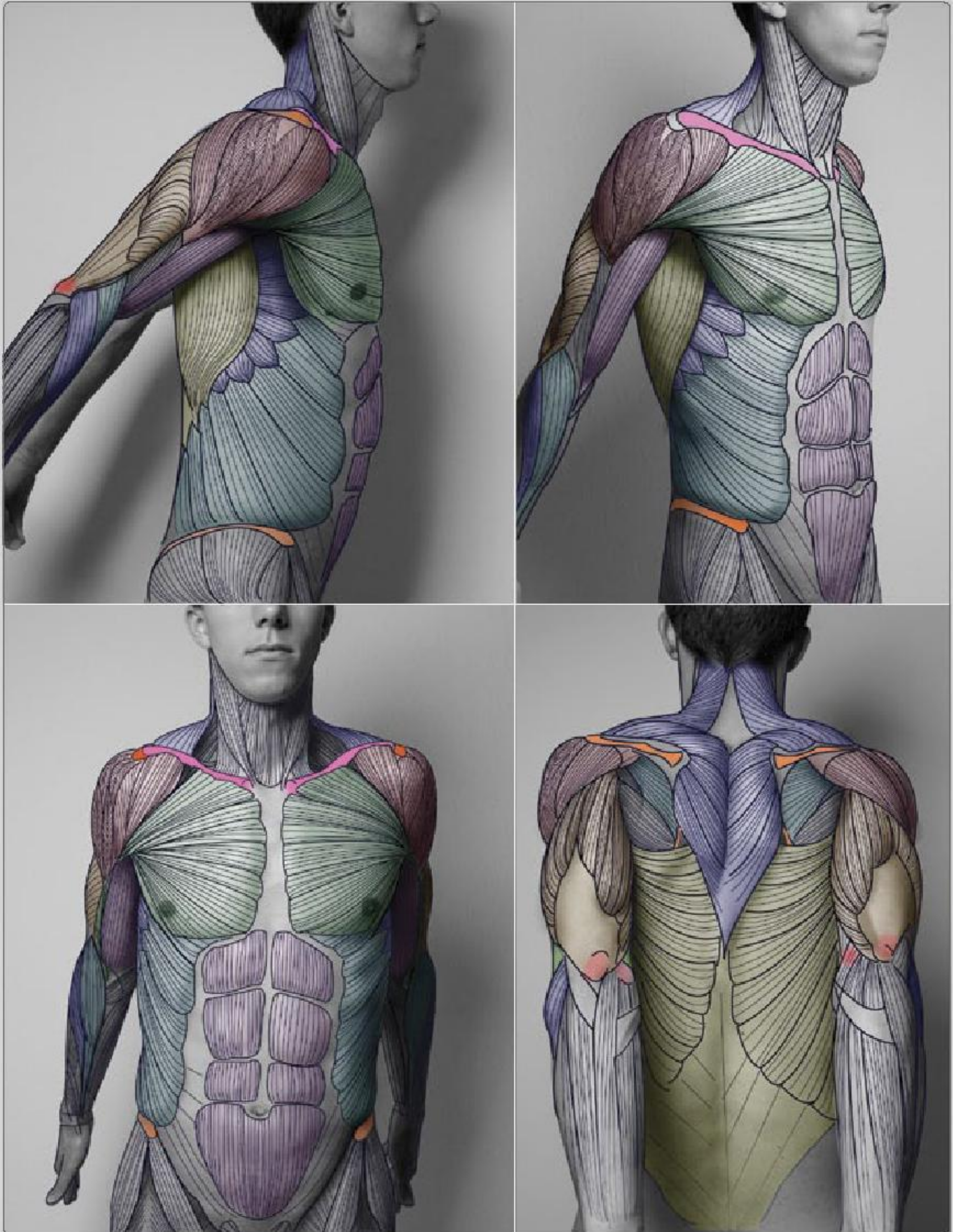


## REACHING BACK



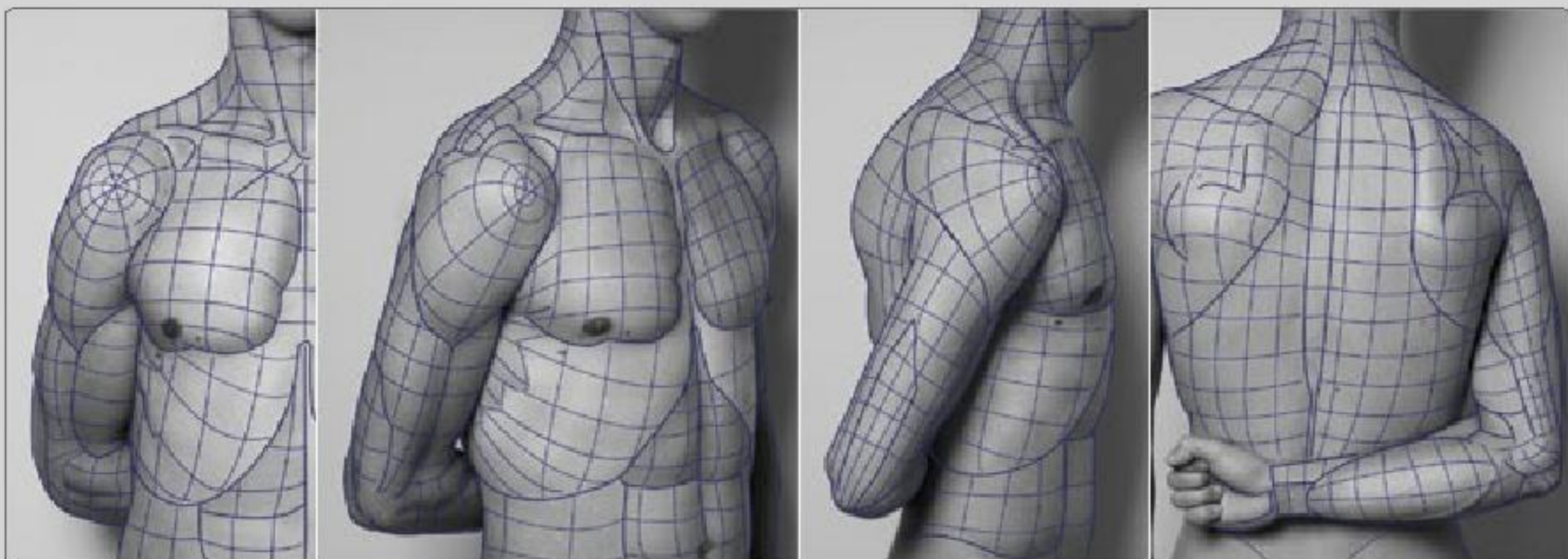
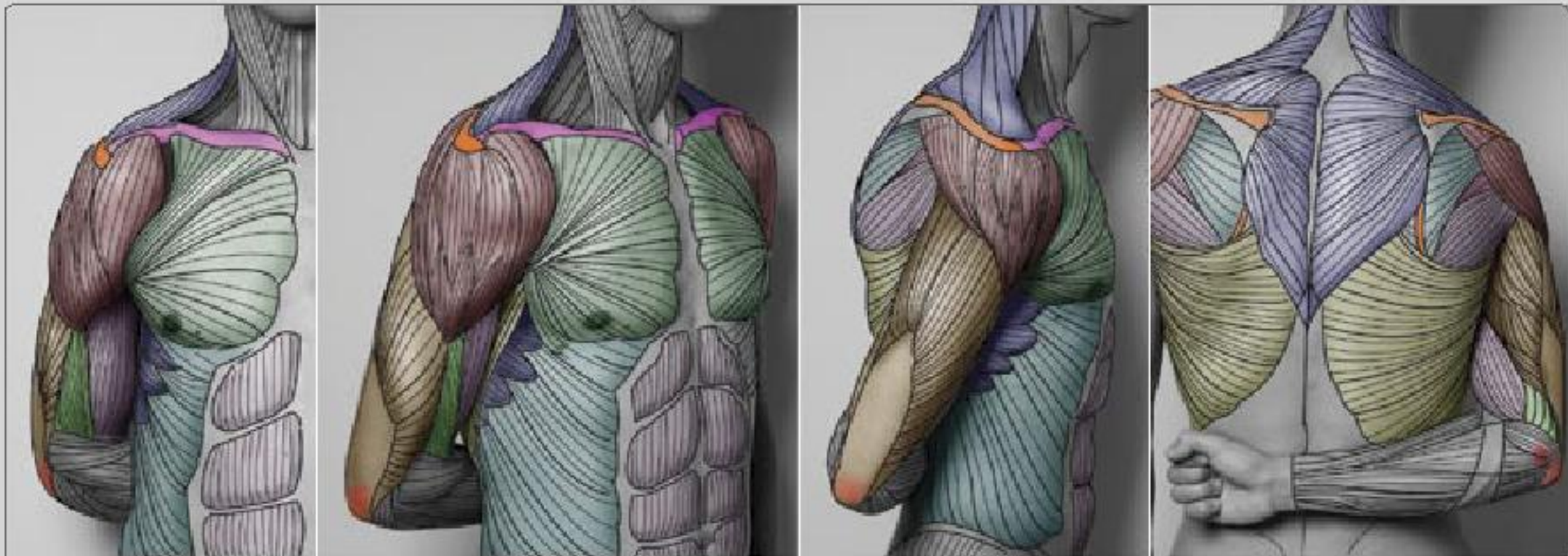


## REACHING BACK



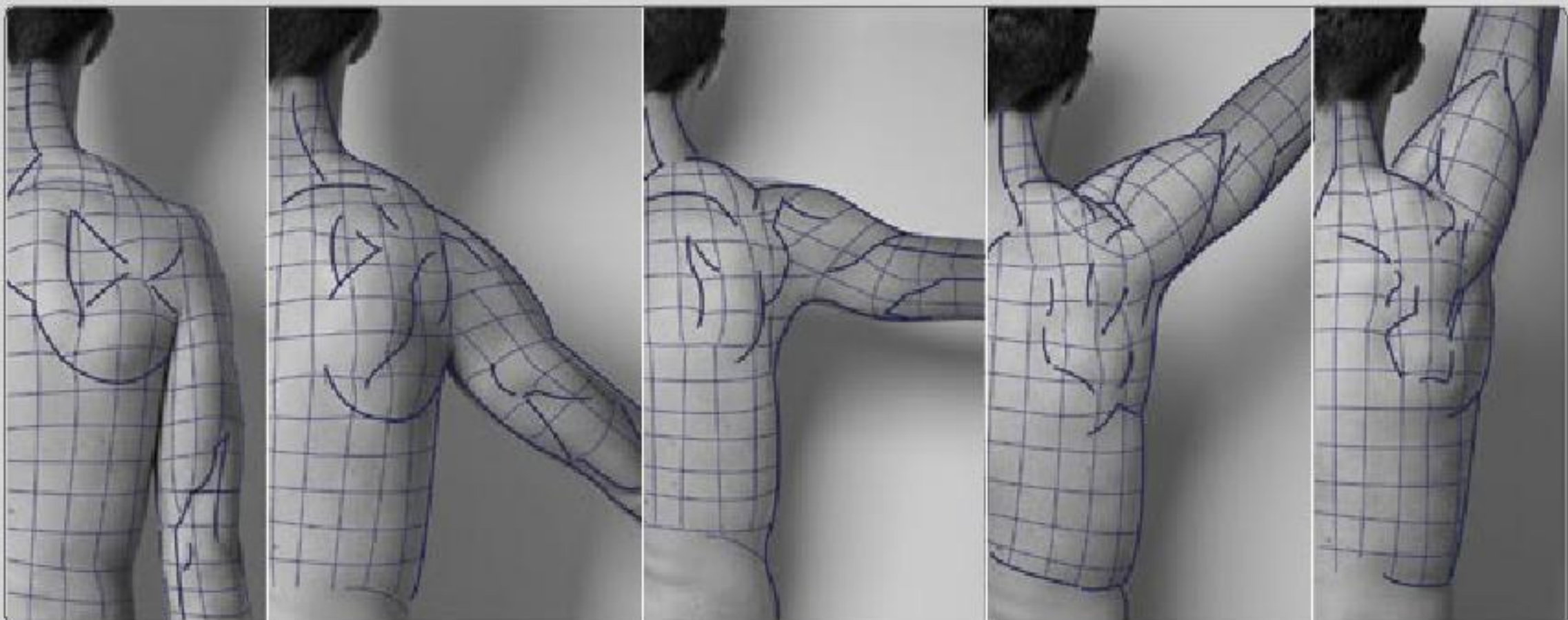
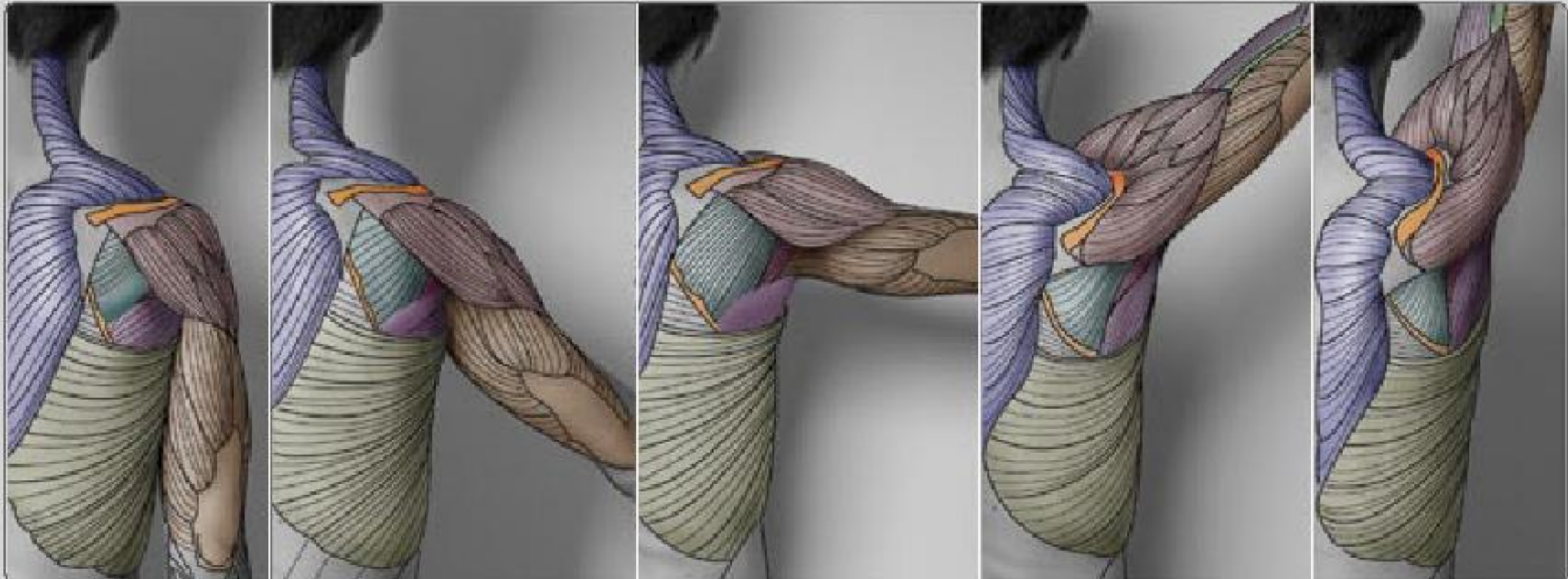
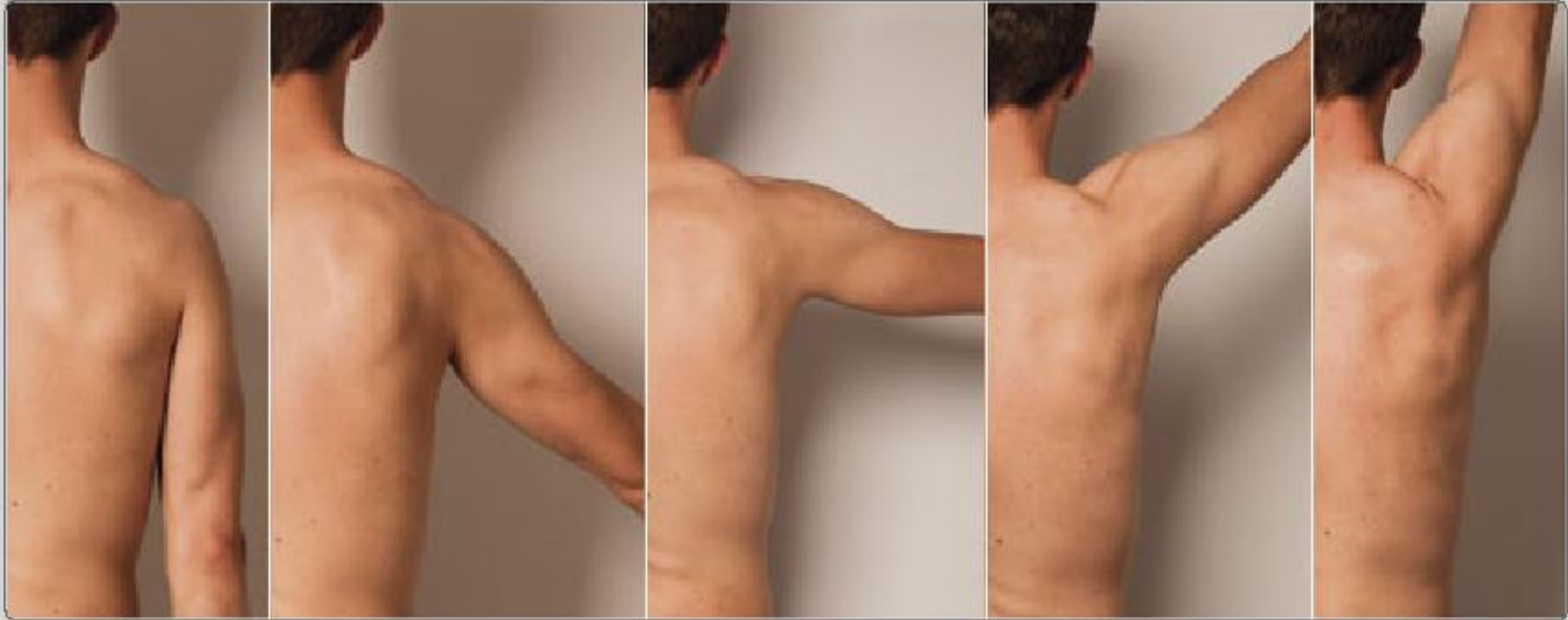


## ONE ARM BEHIND BACK



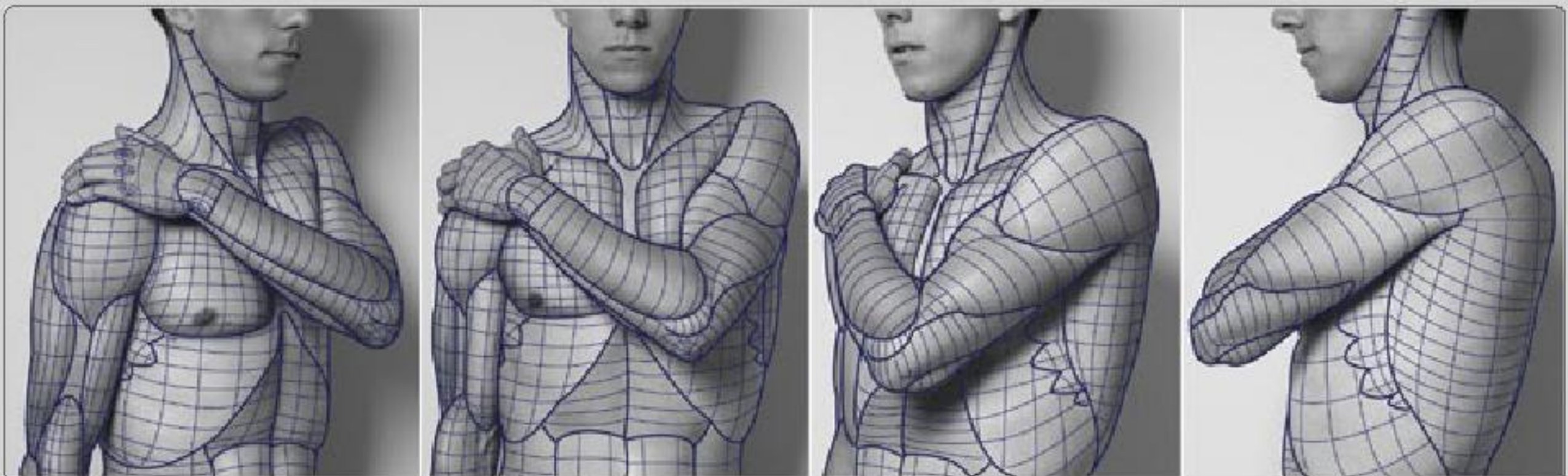
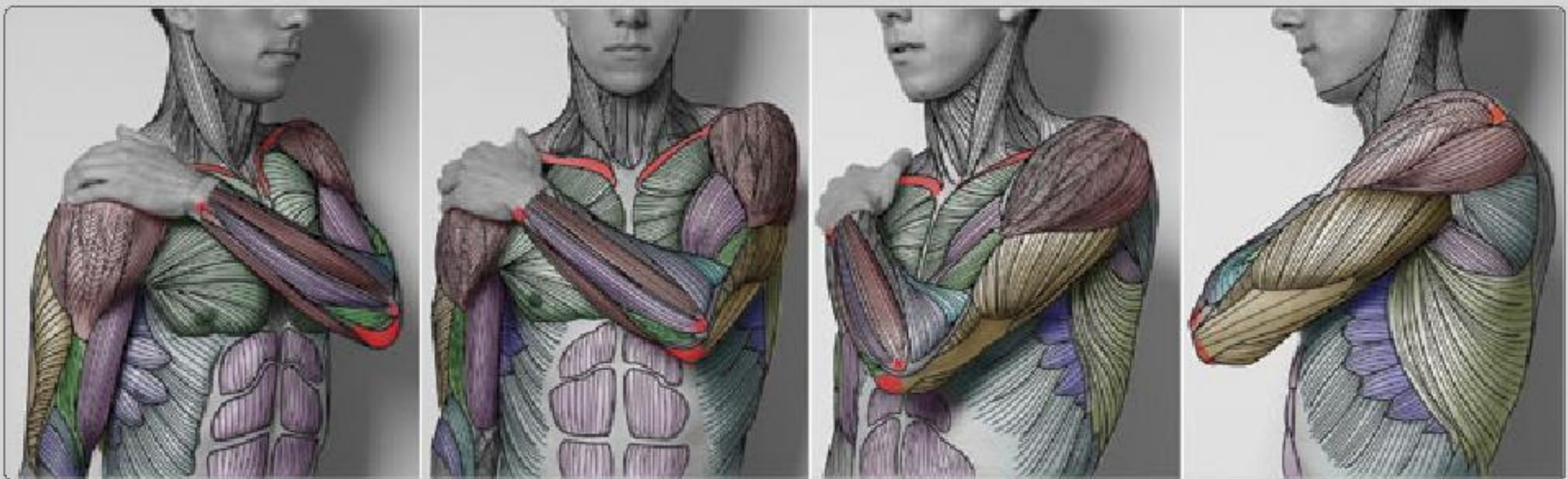


## LIFTING ARM HIGHER AND HIGHER



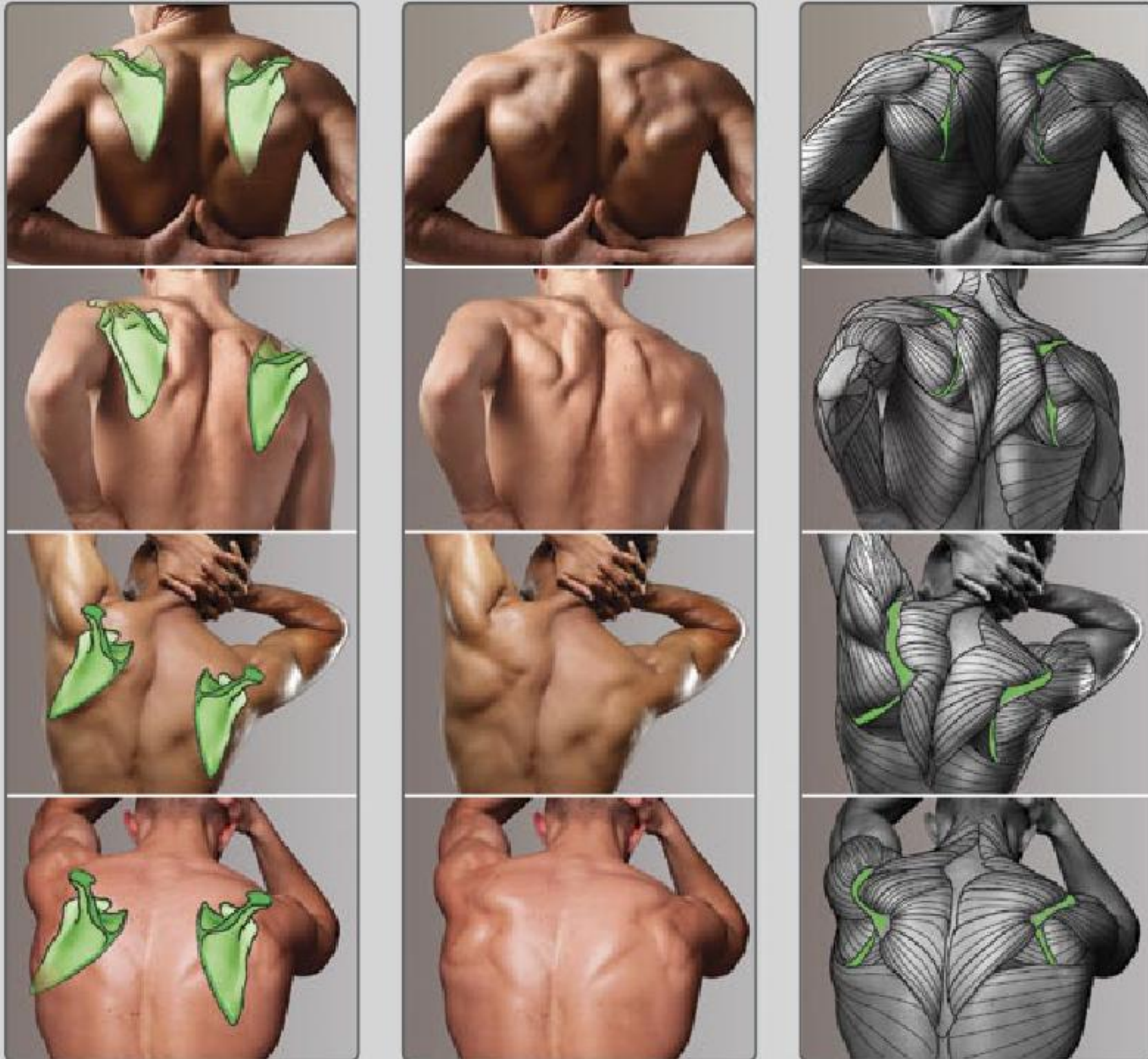


## HAND HOLDING OPPOSITE SHOULDER

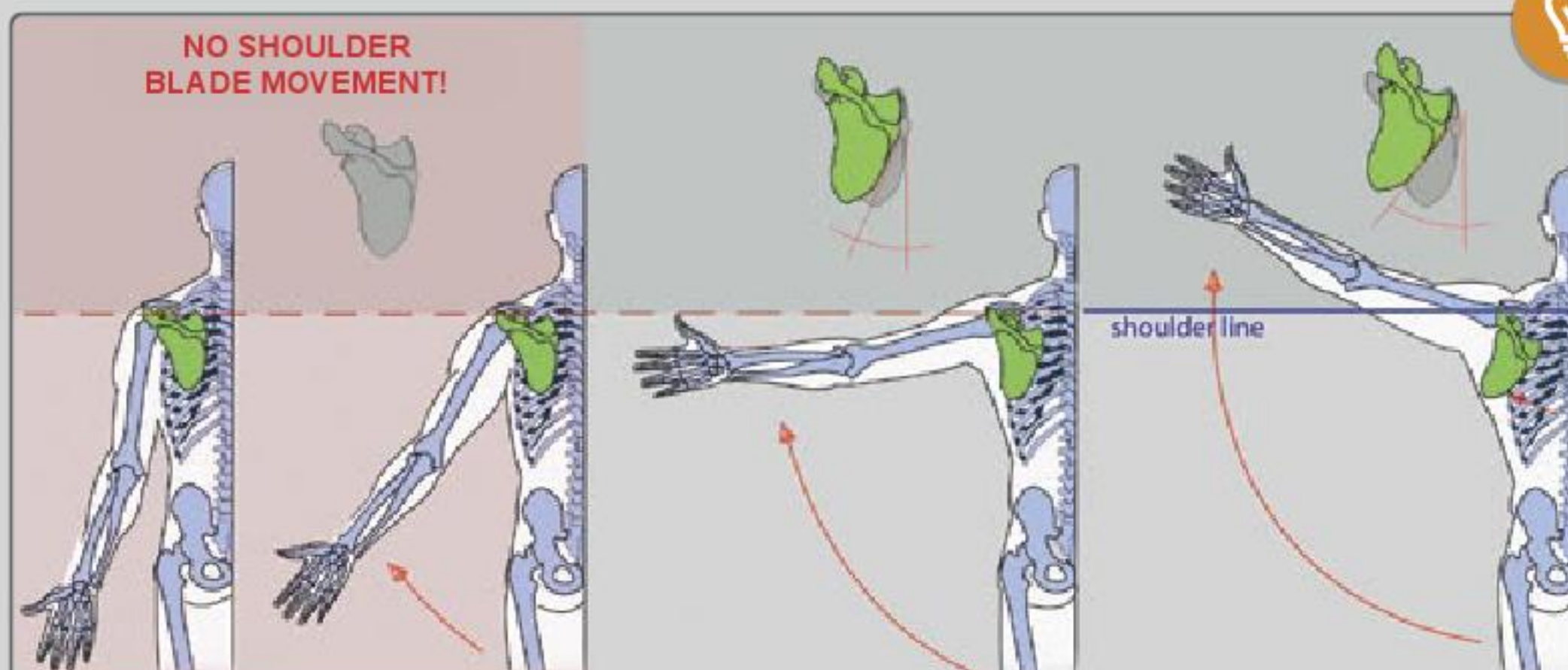




## LET'S FIND SHOULDER BLADES (SCAPULA)!



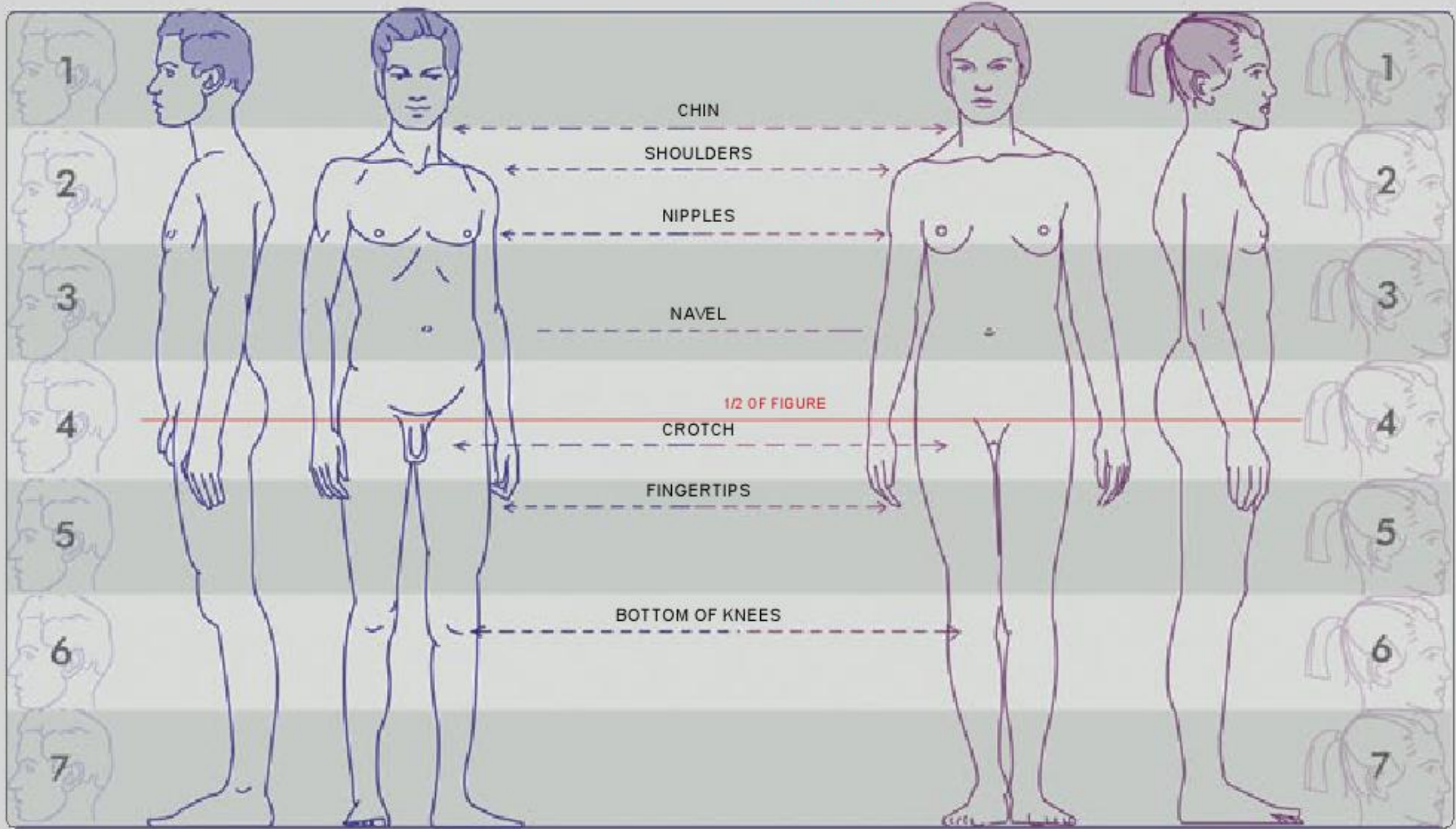
## ROTATION OF THE SHOULDER BLADE



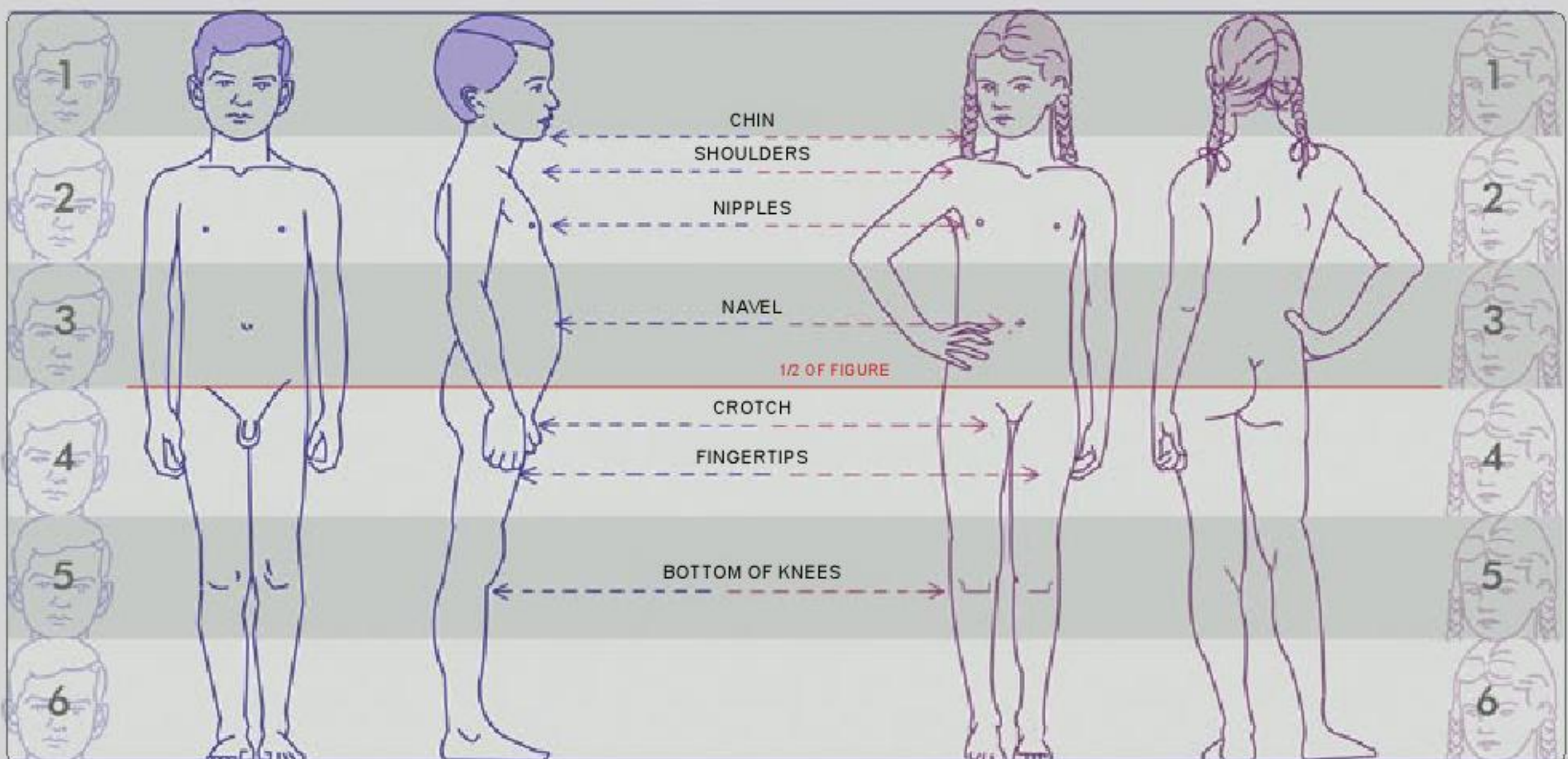


## PROPORTIONS OF TEENAGER AND CHILD

TEENAGER PROPORTIONS - 7 HEAD UNITS



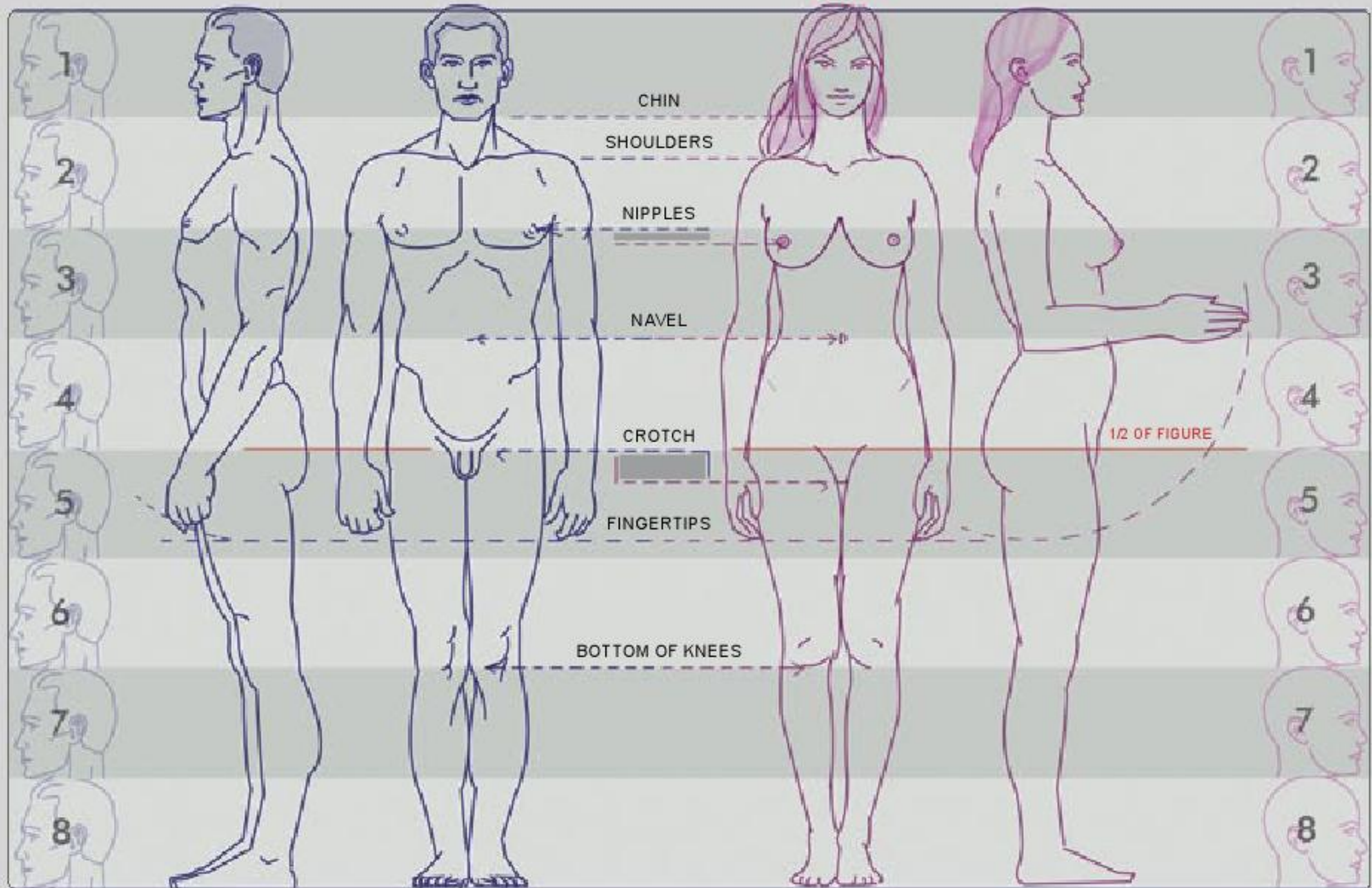
CHILD PROPORTIONS (AGES 8 - 12) - 6 HEAD UNITS



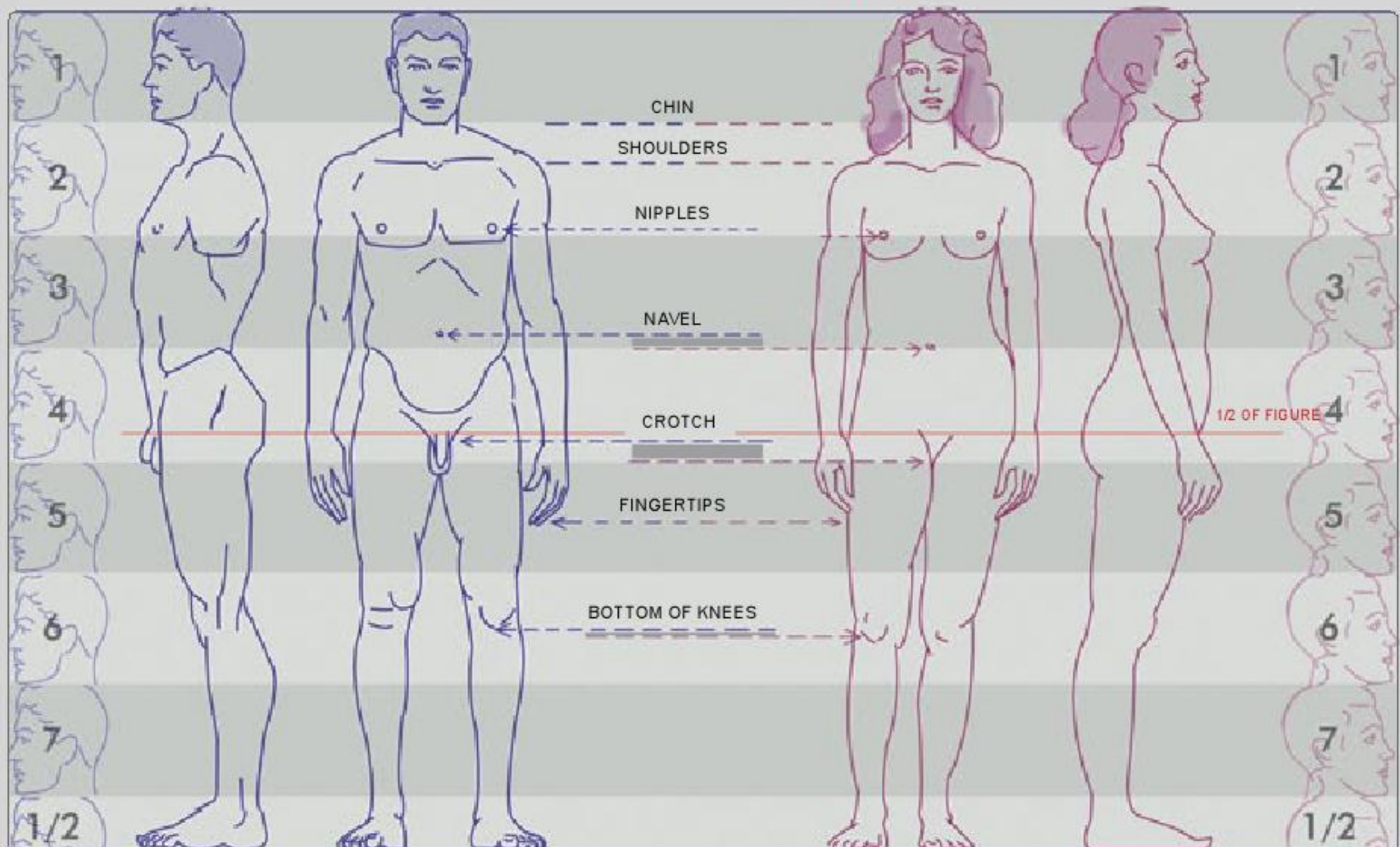


## PROPORTIONS OF ADULT MALE AND FEMALE

IDEALIZED ADULT PROPORTIONS - 8 HEAD UNITS



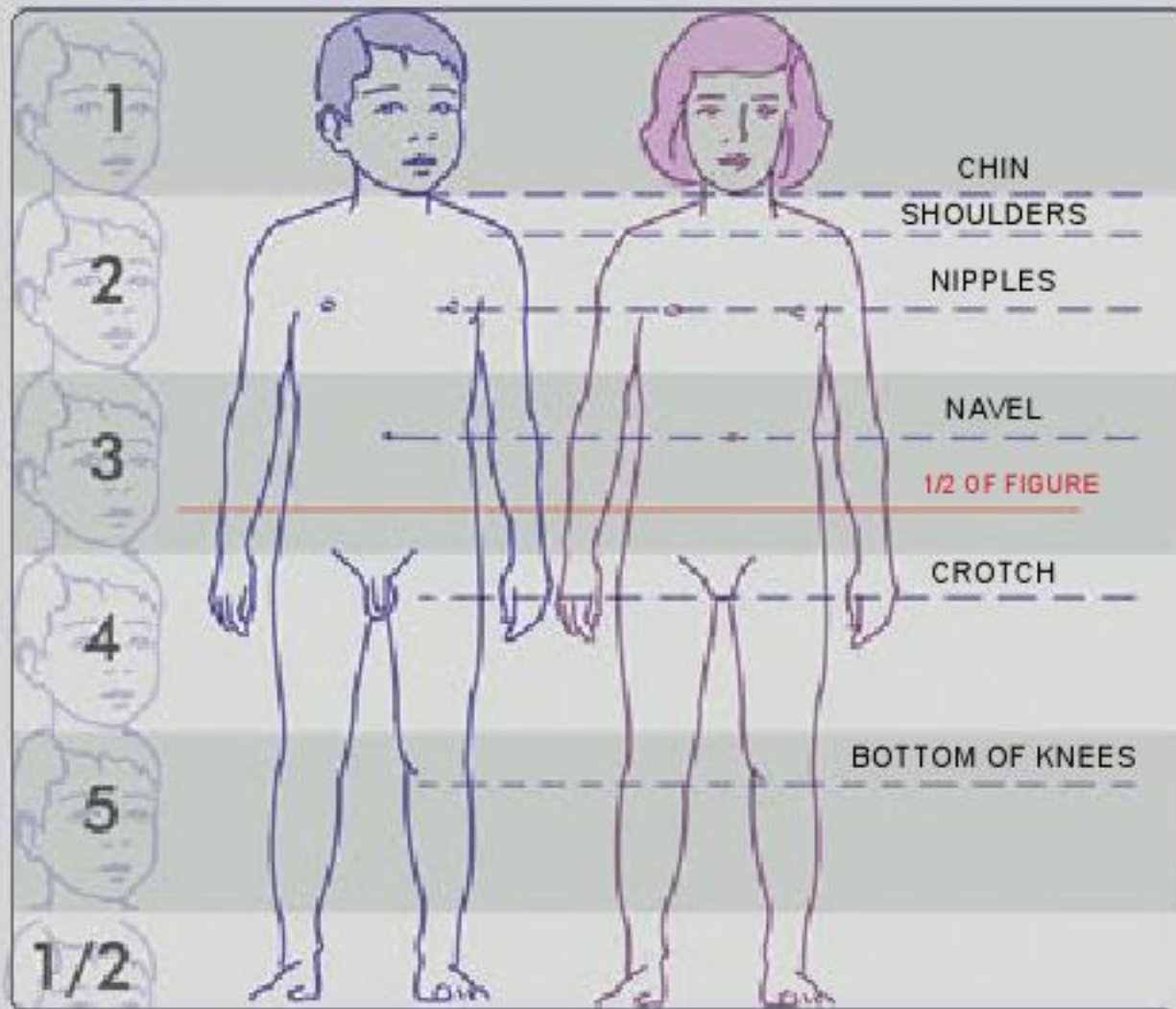
REALISTIC ADULT PROPORTIONS - 7.5 HEAD UNITS



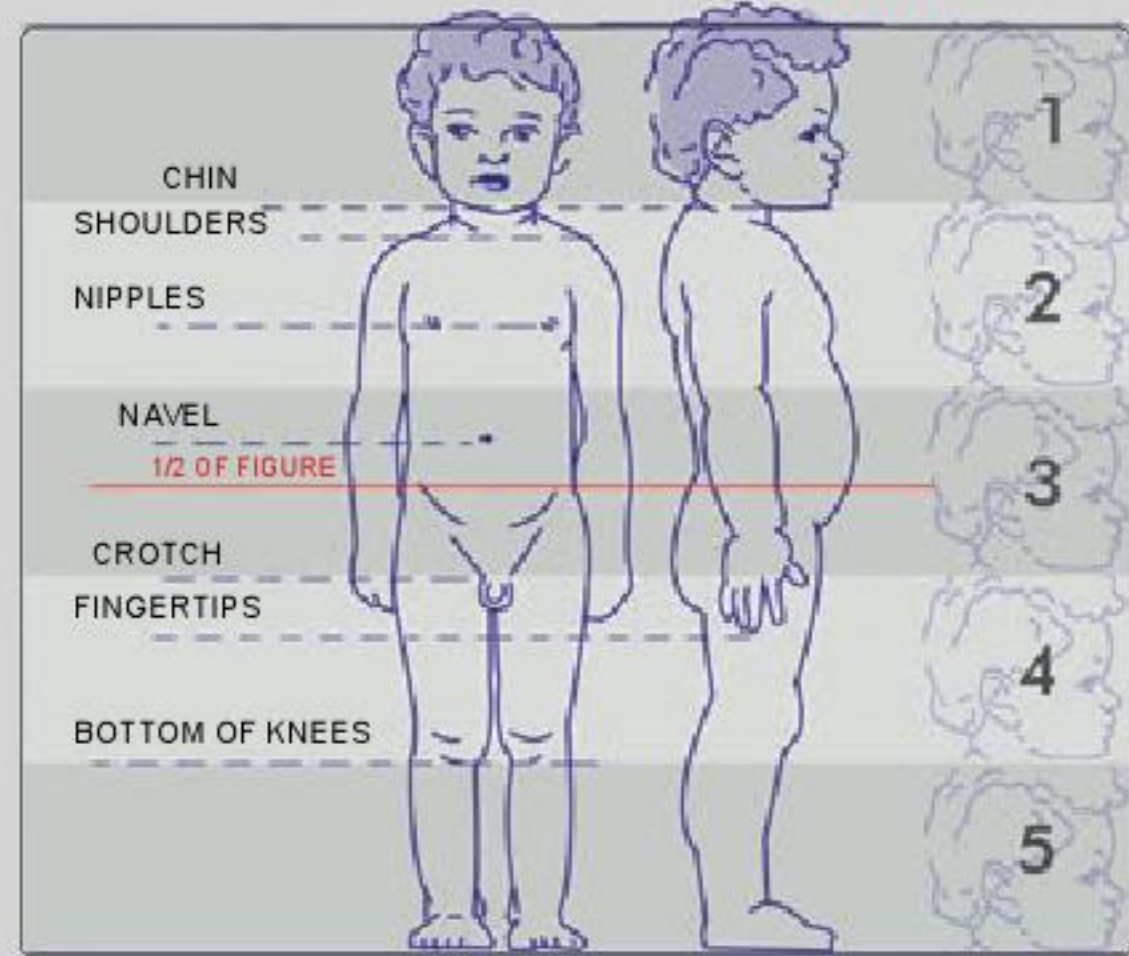


## PROPORTIONS OF CHILD, TODDLER, NEWBORN AND SENIOR

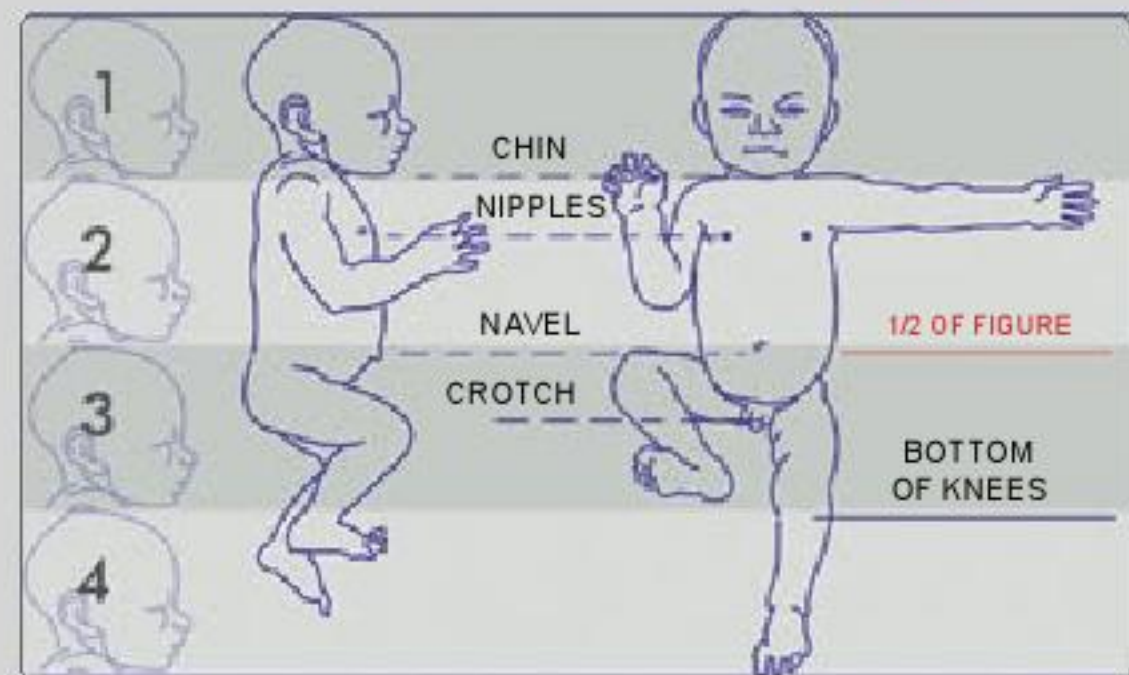
CHILD: **5.5 HEAD** UNITS



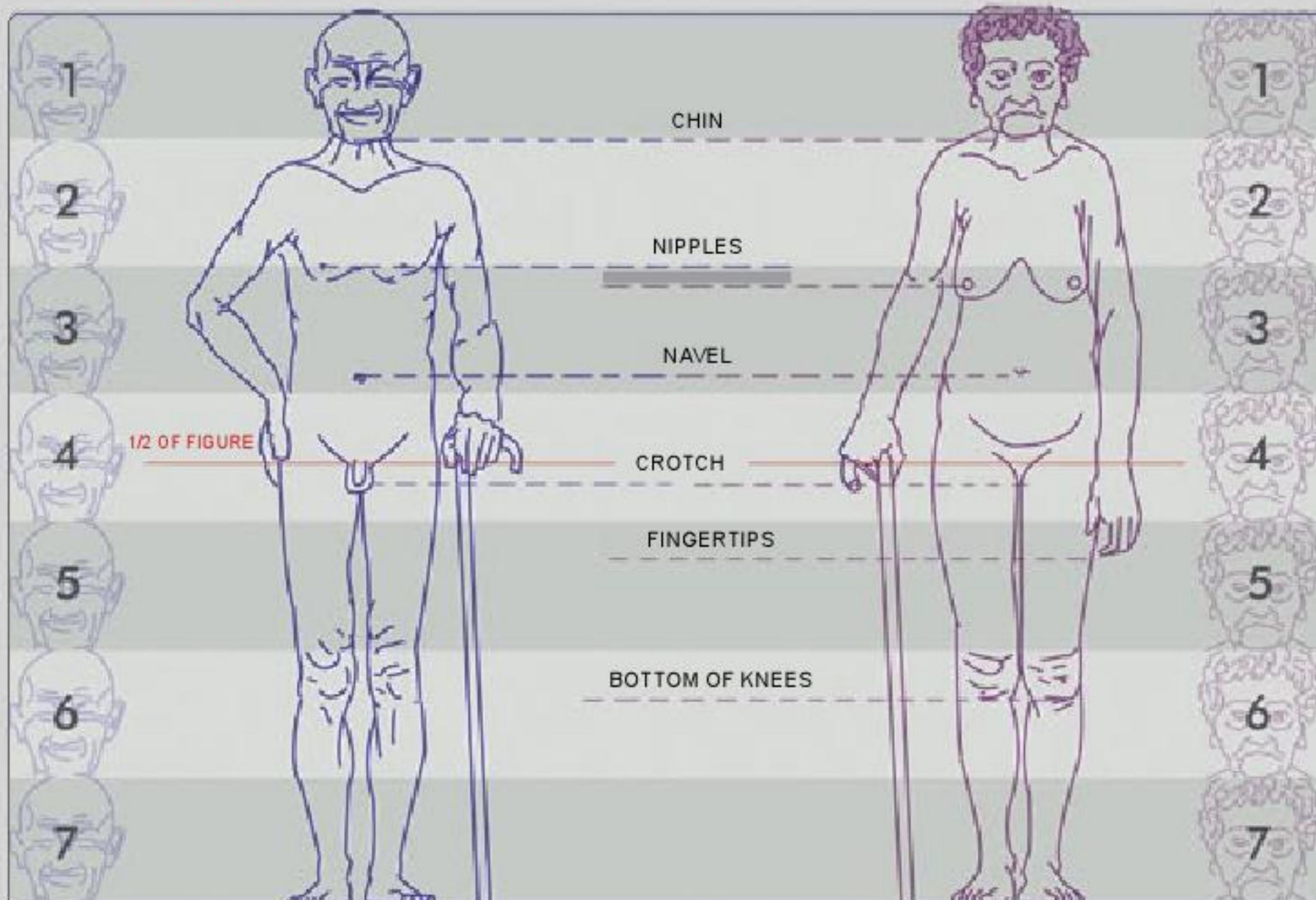
TODDLER: **5 HEAD** UNITS



NEWBORN: **4 HEAD** UNITS



SENIOR: **7 HEAD** UNITS

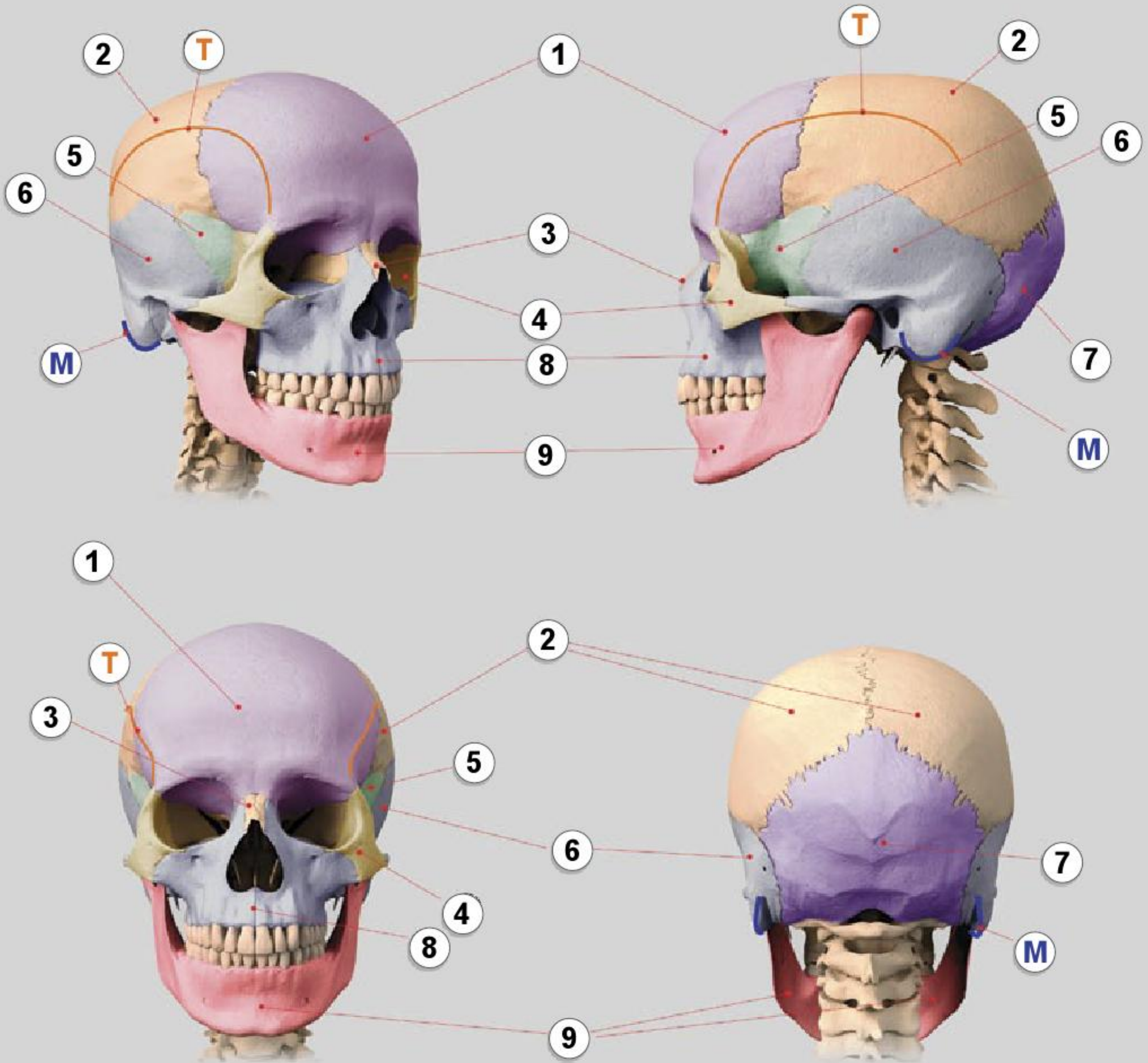








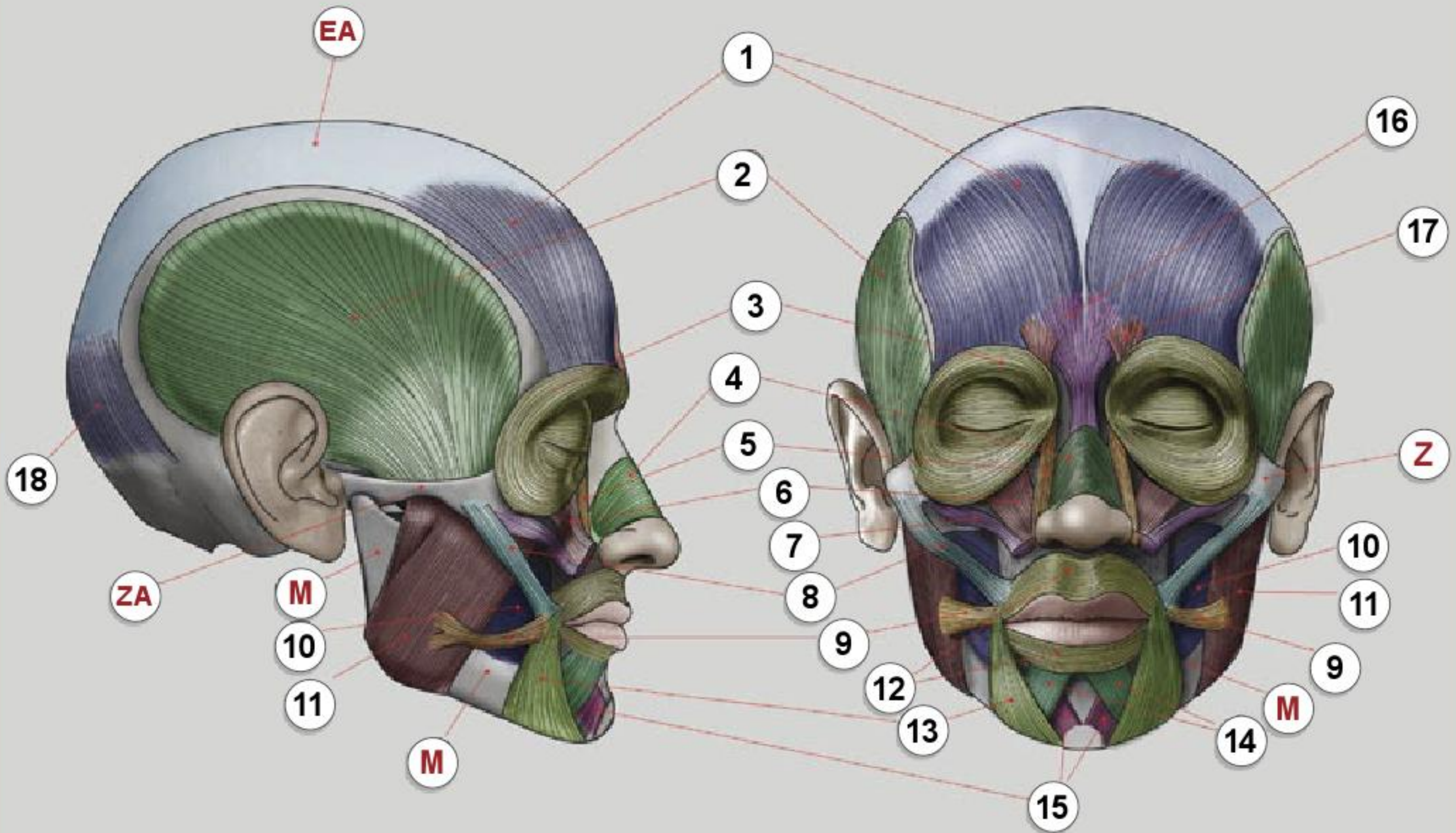
## MAJOR SKULL BONES



|          |               |          |                 |          |                |
|----------|---------------|----------|-----------------|----------|----------------|
| <b>1</b> | FRONTAL BONE  | <b>4</b> | ZYGOMATIC BONE  | <b>7</b> | OCCIPITAL BONE |
| <b>2</b> | PARIETAL BONE | <b>5</b> | SPHENOID BONE   | <b>8</b> | MAXILLA BONE   |
| <b>3</b> | NASAL BONE    | <b>6</b> | TEMPORAL BONE   | <b>9</b> | MANDIBLE BONE  |
| <b>T</b> | TEMPORAL LINE | <b>M</b> | MASTOID PROCESS |          |                |



## MAJOR HEAD MUSCLES



**1** FRONTALIS MUSCLE

**2** TEMPORAL MUSCLE

**3** ORBICULARIS OCULI MUSCLE

**4** NASALIS MUSCLE

**5** OTTO'S MUSCLE

**6** LEVATOR LABII SUPERIORIS MUSCLE

**7** ZYGOMATICUS MINOR MUSCLE

**8** ZYGOMATICUS MAJOR MUSCLE

**9** RISORII MUSCLE

**10** BUCCINATOR MUSCLE

**M** MANDIBLE (LOWER JAW)

**11** MASSETER MUSCLE

**12** ORBICULARIS ORIS MUSCLE

**13** DEPRESSOR ANGULI ORIS MUSCLE

**14** DEPRESSOR LABII INFERIORIS MUSCLE

**15** MENTALIS MUSCLE

**16** PROCERUS MUSCLE

**17** CORRUGATOR MUSCLE

**18** OCCIPITALIS MUSCLE

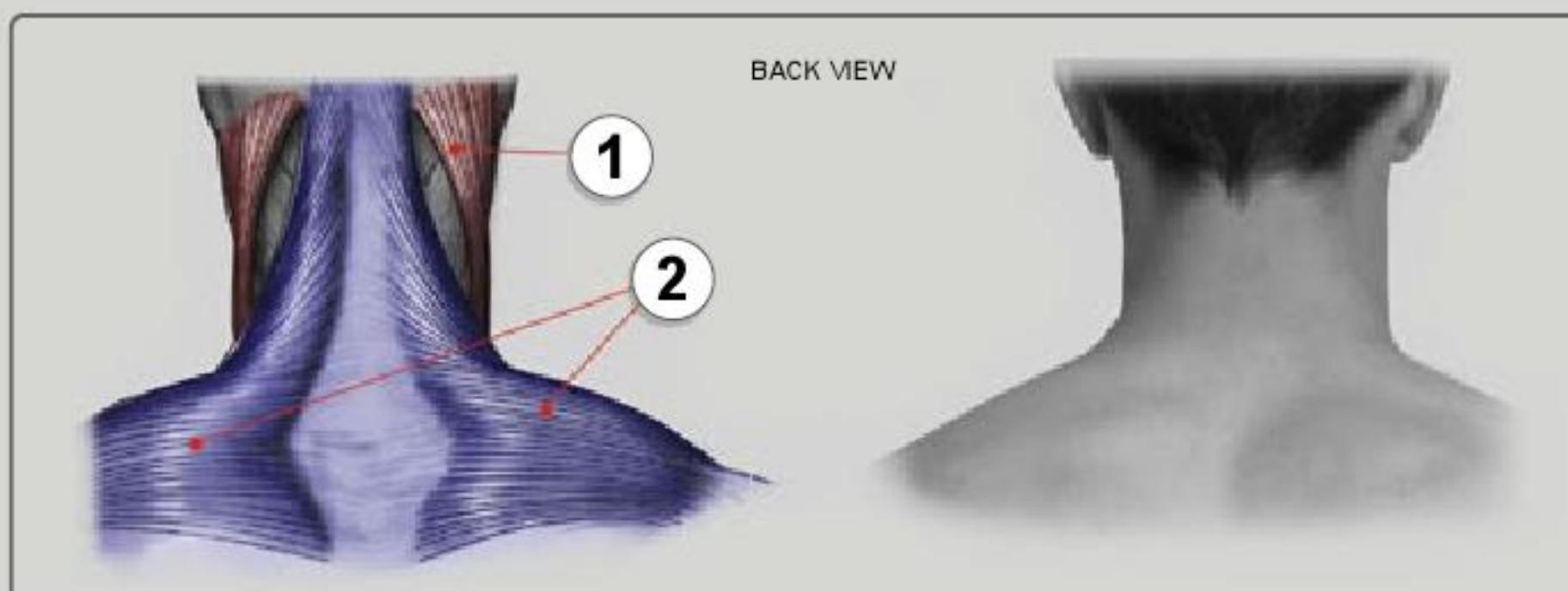
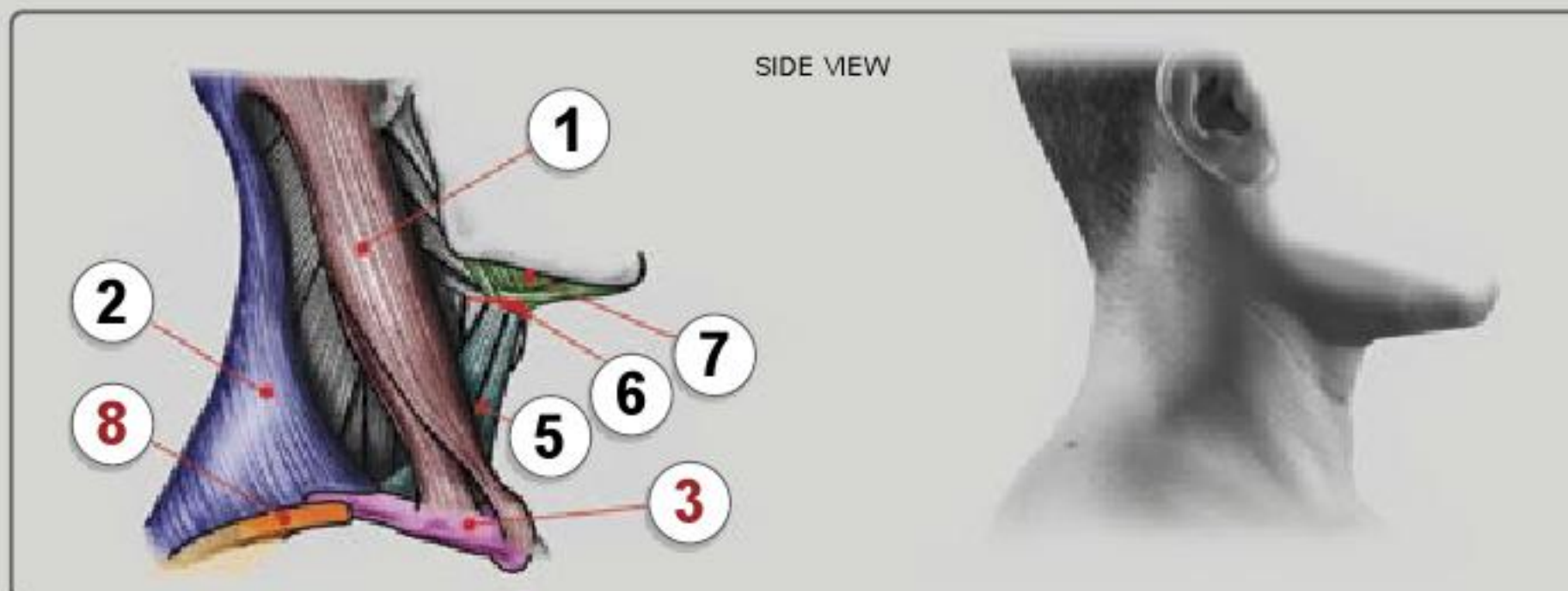
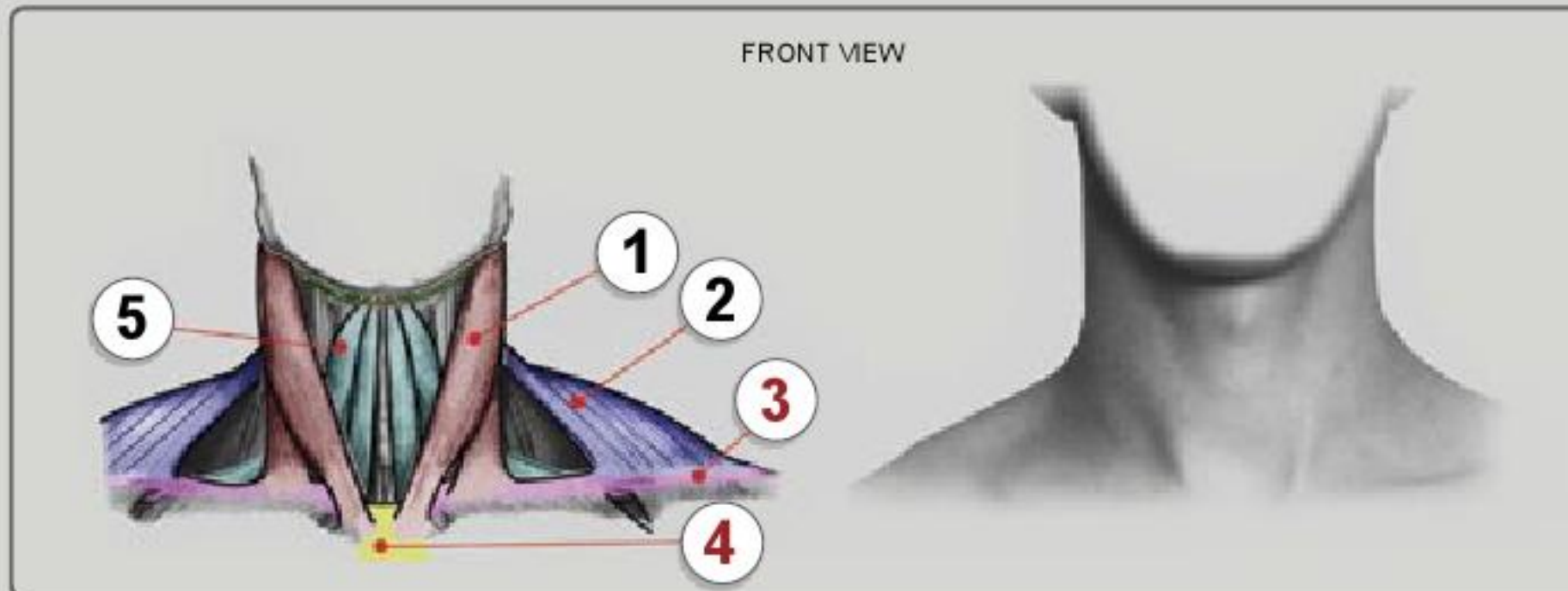
**Z** ZYGOMATIC BONE

**ZA** ZYGOMATIC ARCH

**EA** EPICRANIAL APONEUROSIS



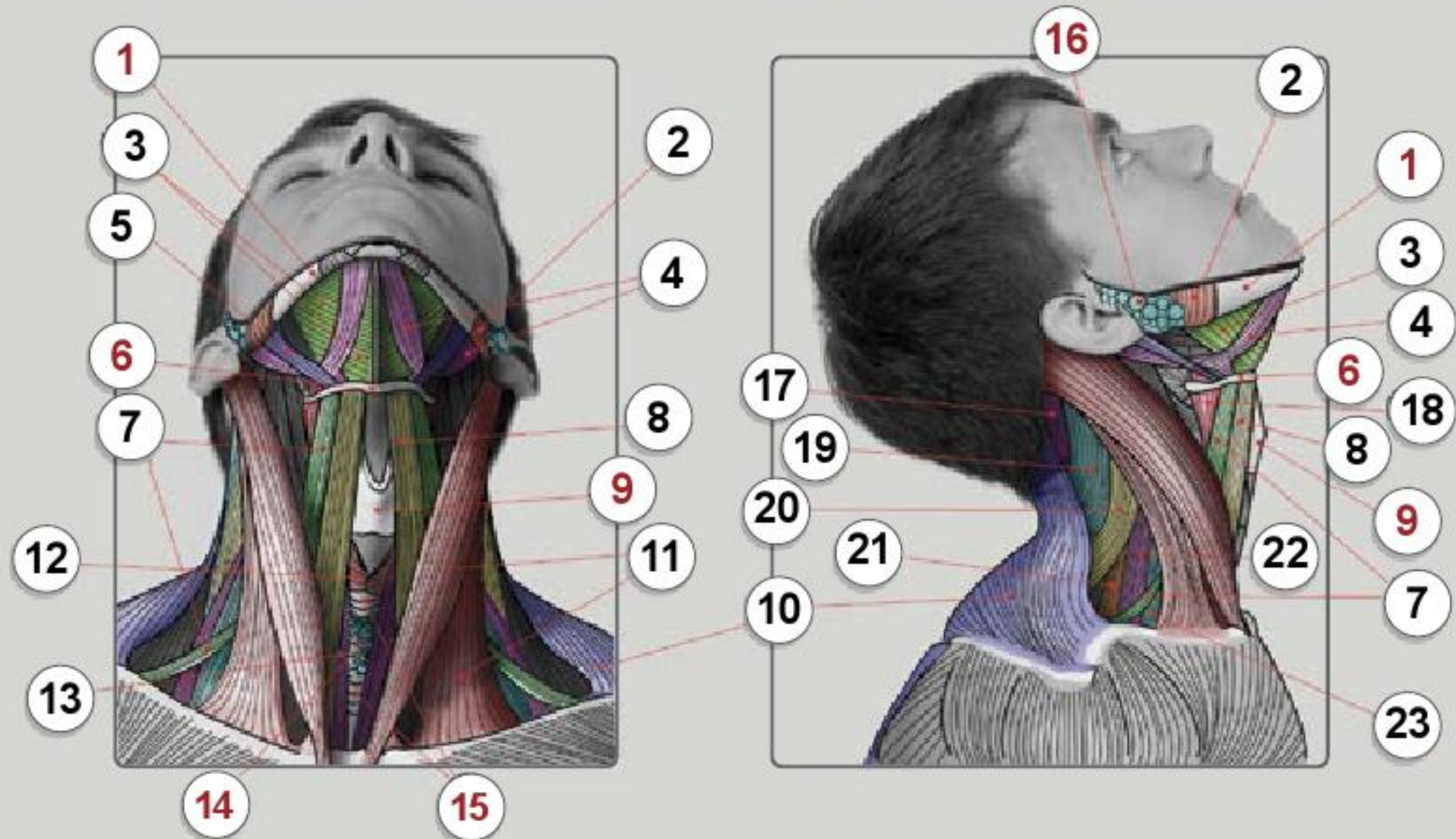
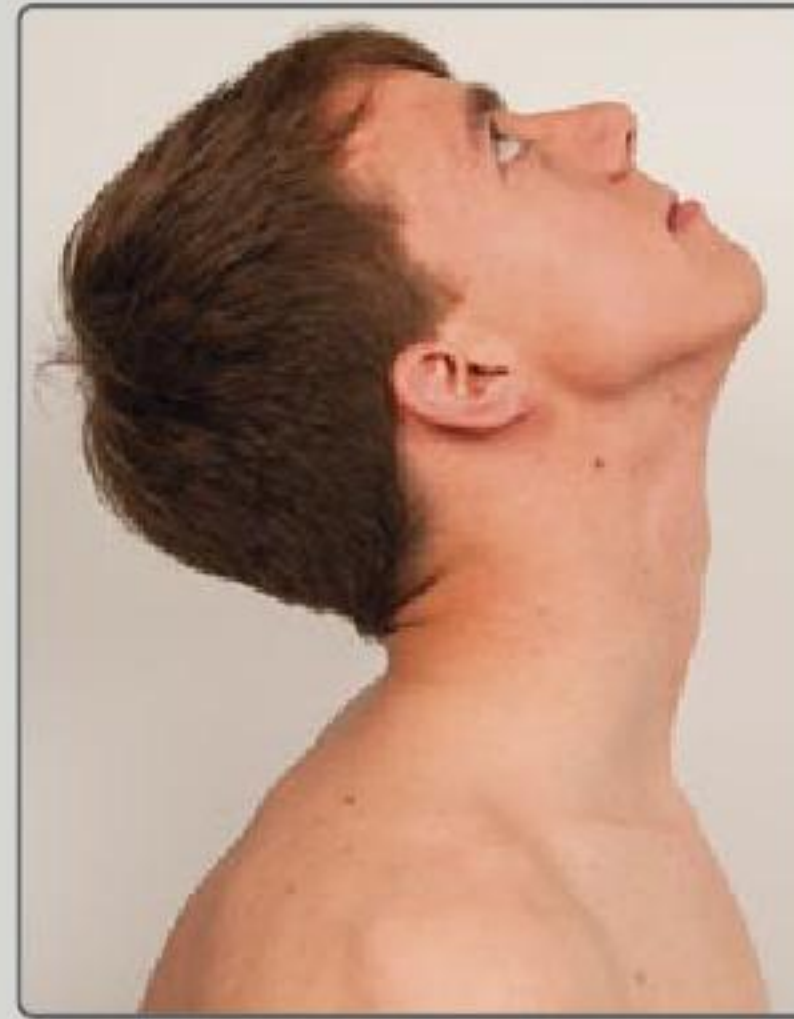
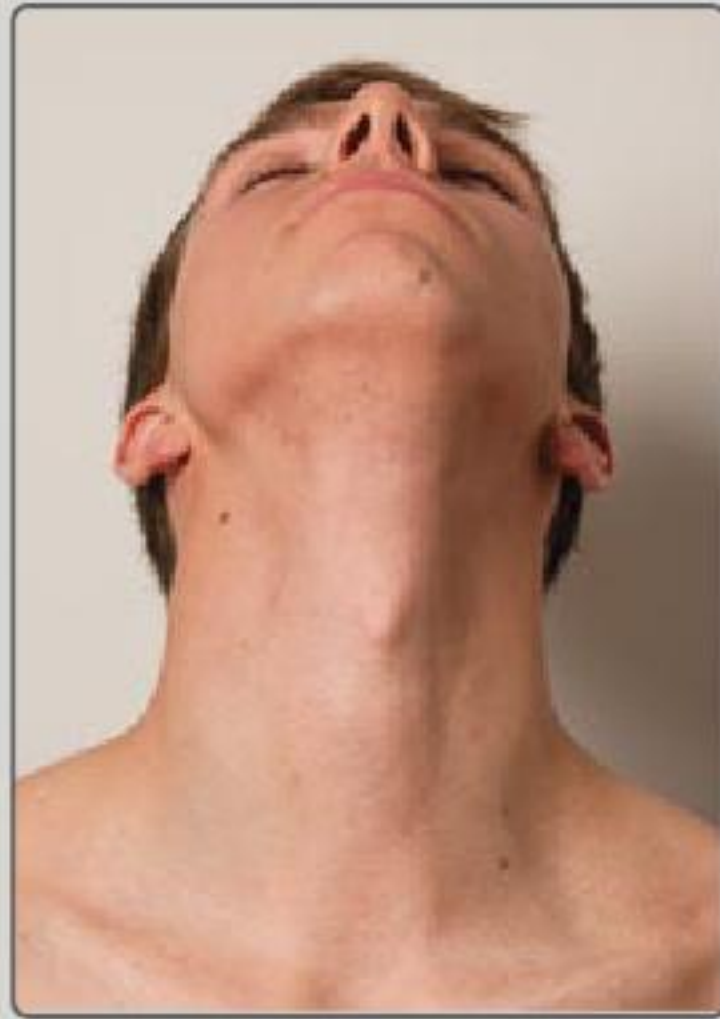
## MAIN NECK MUSCLES



- |                                 |                               |                                   |
|---------------------------------|-------------------------------|-----------------------------------|
| <b>1</b> STERNOCLEIDOMASTOID    | <b>4</b> CHEST BONE (STERNUM) | <b>7</b> SUPRAHYOID MUSCLES       |
| <b>2</b> TRAPEZIUS              | <b>5</b> INFRAHYOID MUSCLES   | <b>8</b> SHOULDER BLADE (SCAPULA) |
| <b>3</b> COLLAR BONE (CLAVICLE) | <b>6</b> HYOID BONE           |                                   |



## MAIN NECK MUSCLES



**1** LOWER JAW (MANDIBLE)

**2** MASSETER

**3** MYLOHYOID

**4** DIGASTRIC

**5** STYLOHYOID

**6** HYOID BONE

**7** OMOHYOID

**8** STERNOHYOID

**9** ADAM'S APPLE (LARYNGEAL PROMINENCE)

**10** TRAPEZIUS

**11** STERNOCLEIDOMASTOID

**12** CRICOTHYROID

**13** STERNOTHYROID

**14** THYROID GLAND

**15** TRACHEA

**16** PAROTID GLAND

**17** SEMISPINALIS CAPITIS

**18** HYOGLOSSUS

**19** SPLENIUS CAPITIS

**20** LEVATOR SCAPULAE

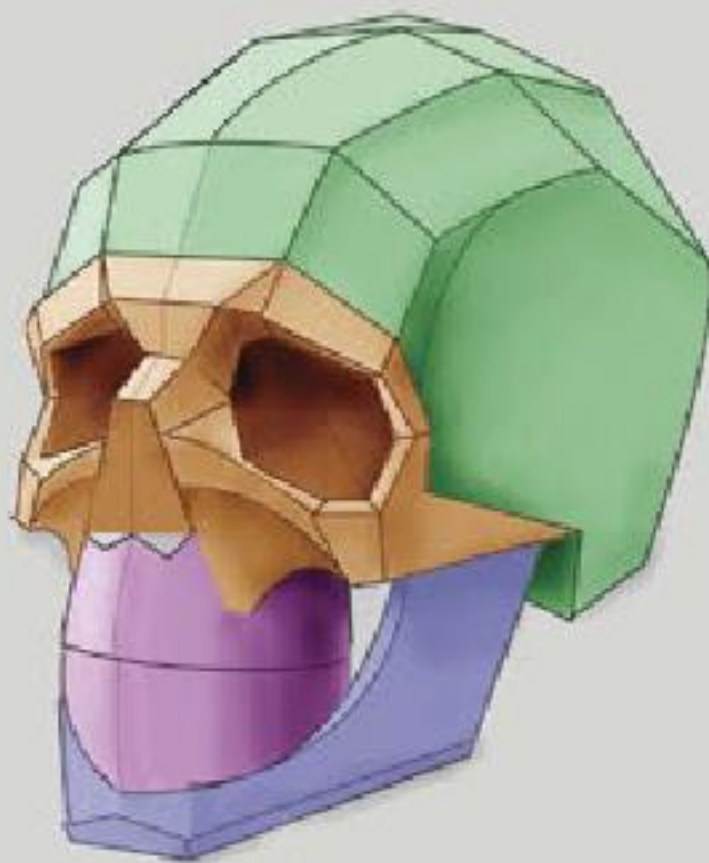
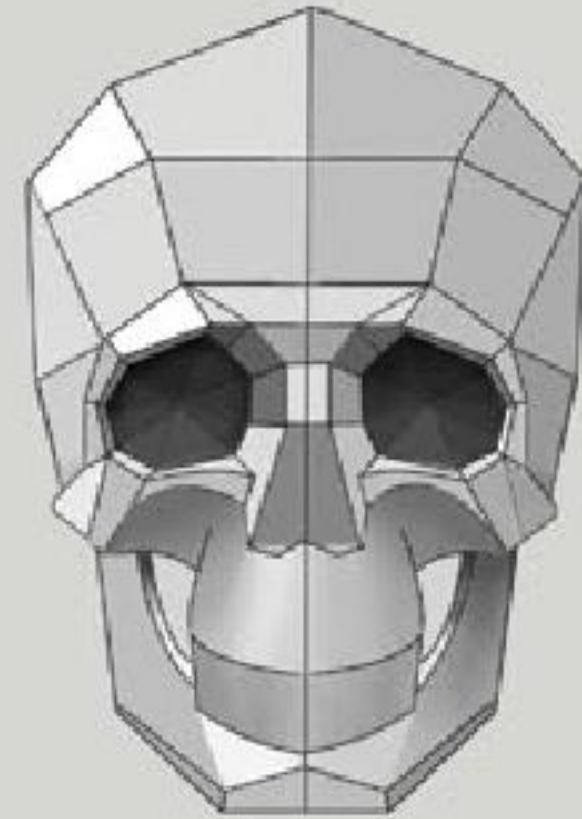
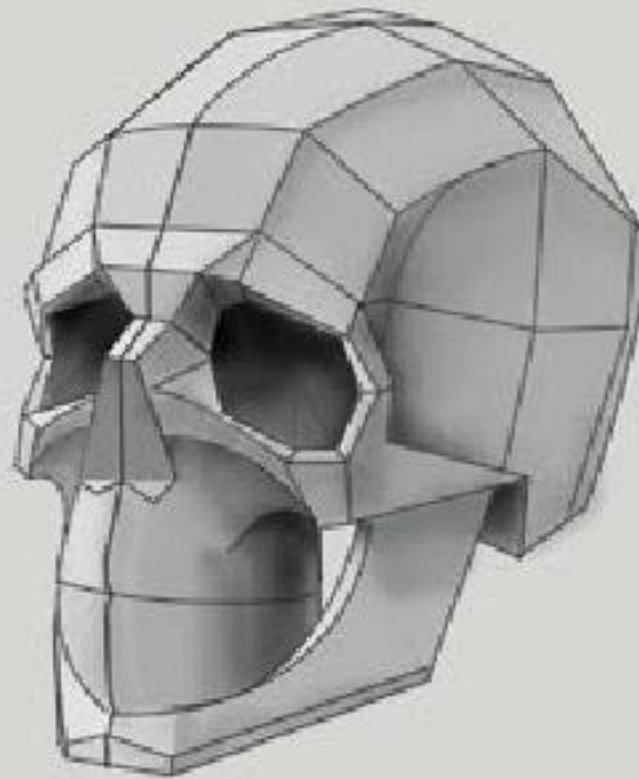
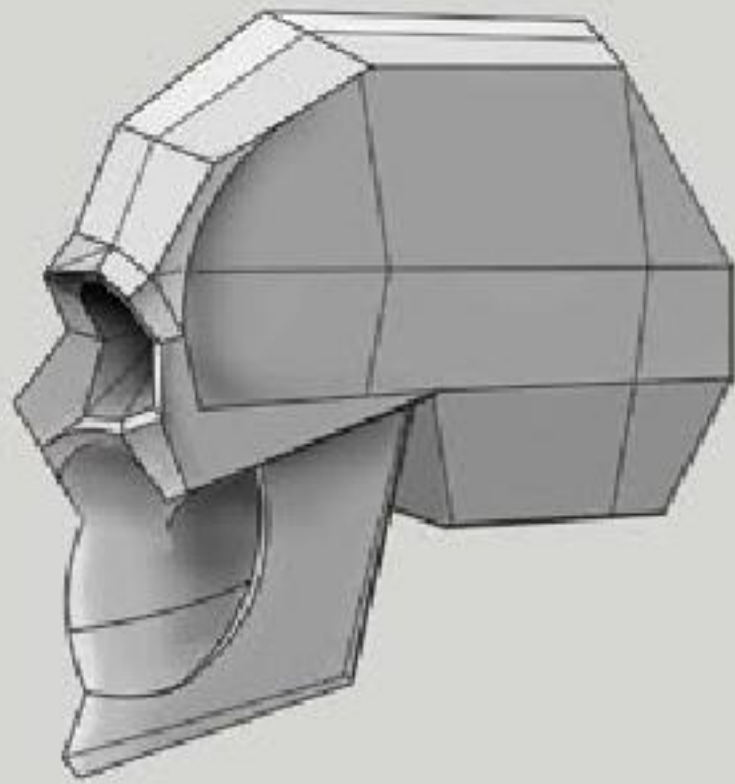
**21** SCALENUS POSTERIOR

**22** SCALENUS MEDIUS

**23** SCALENUS ANTERIOR

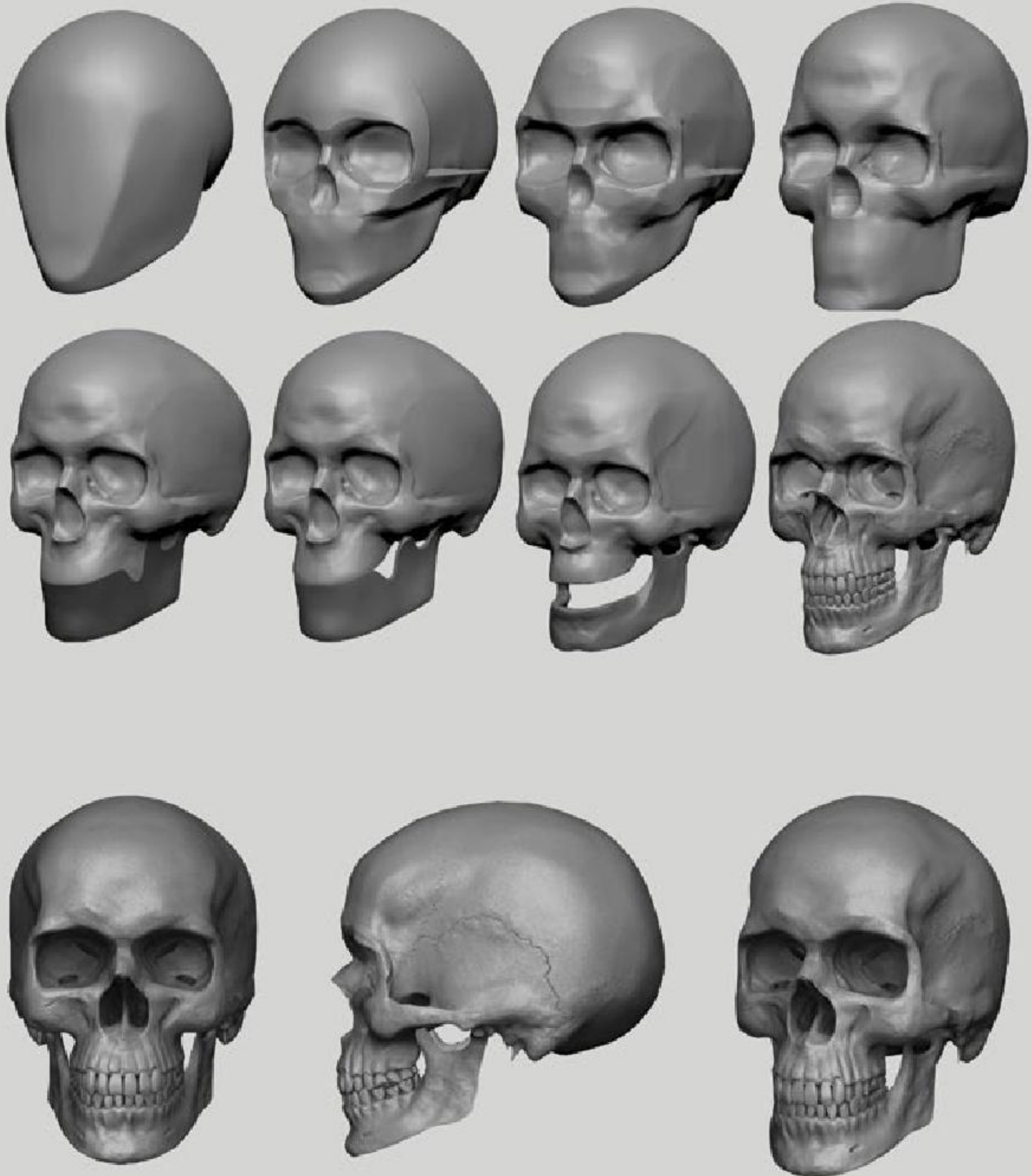


## SHAPES THAT FORM A SKULL



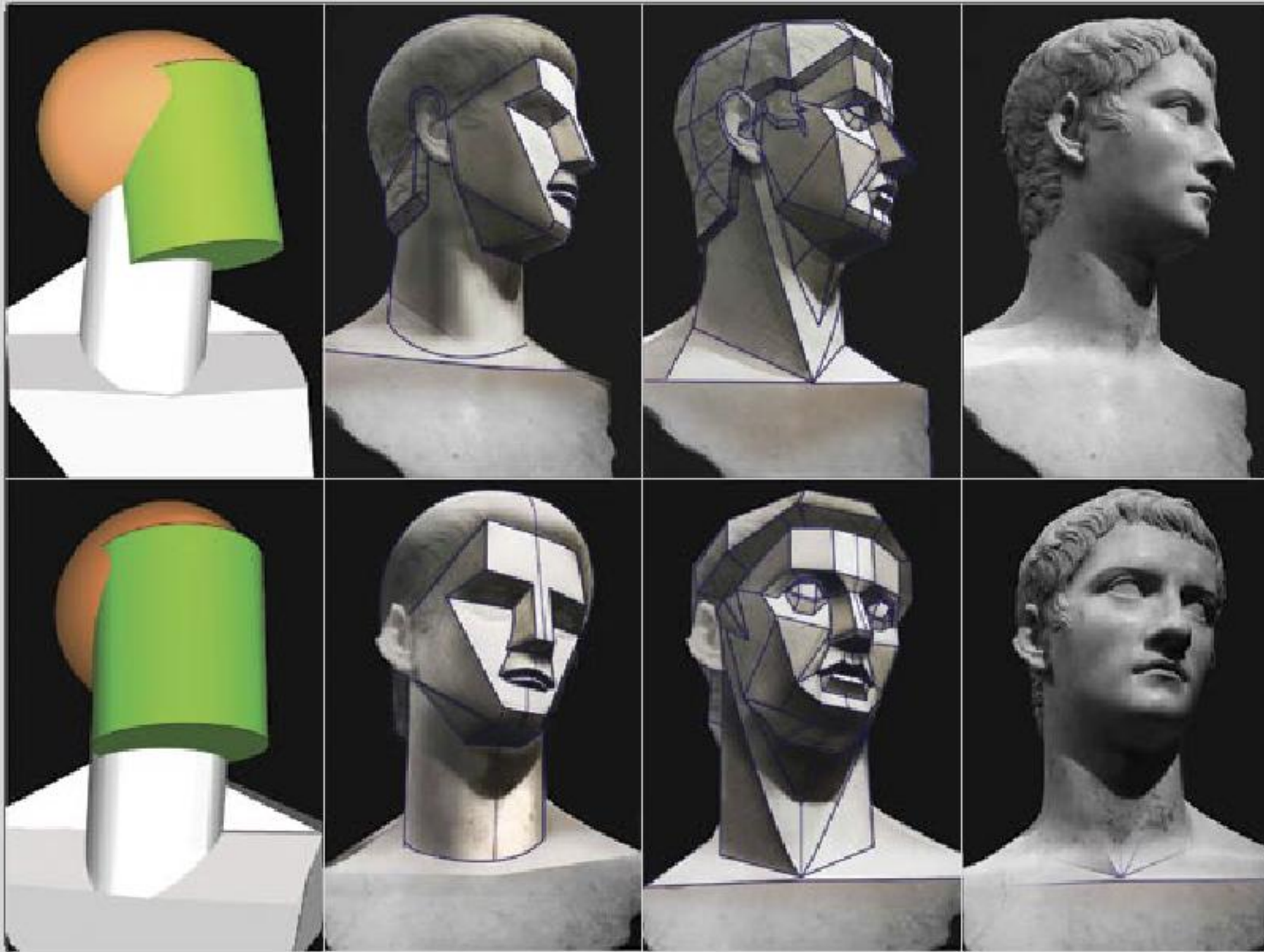


## MODELING A 3D SKULL

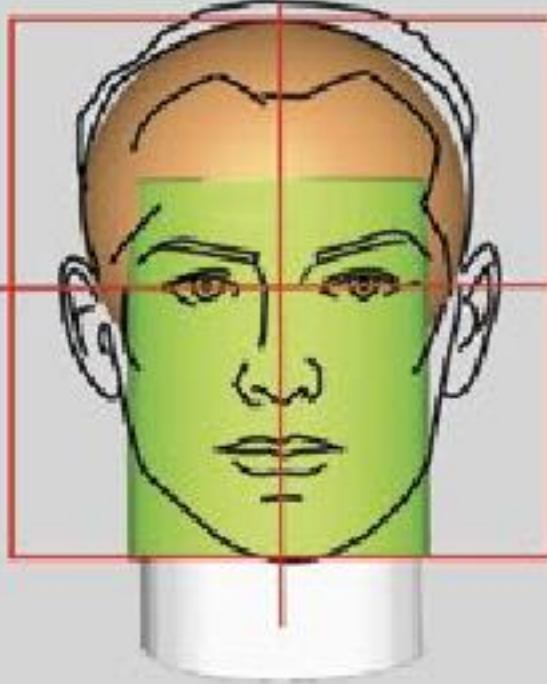




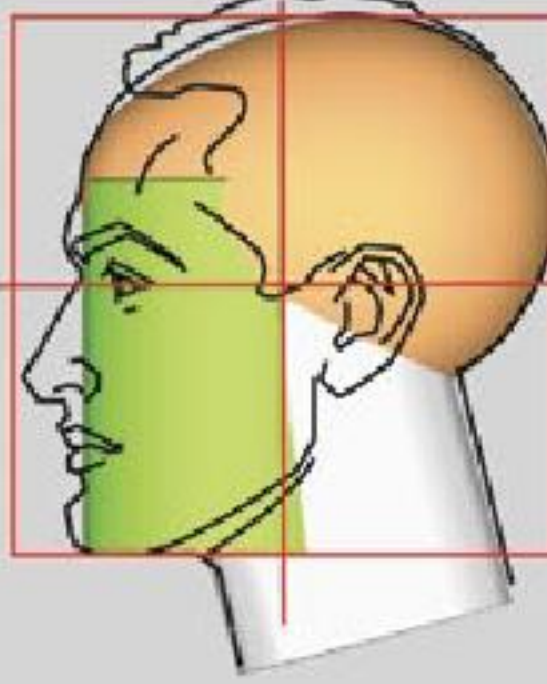
## HEAD SHAPE AND MASSES



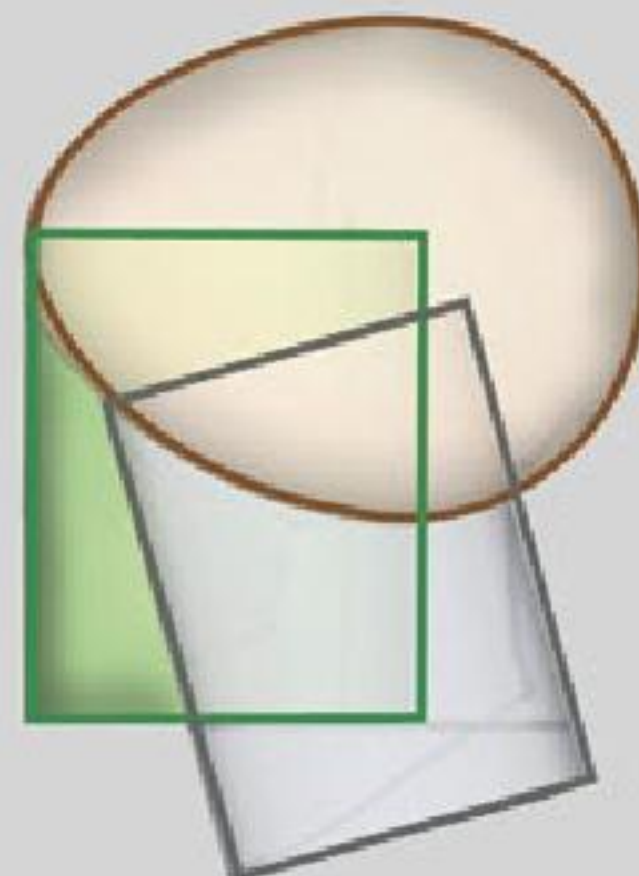
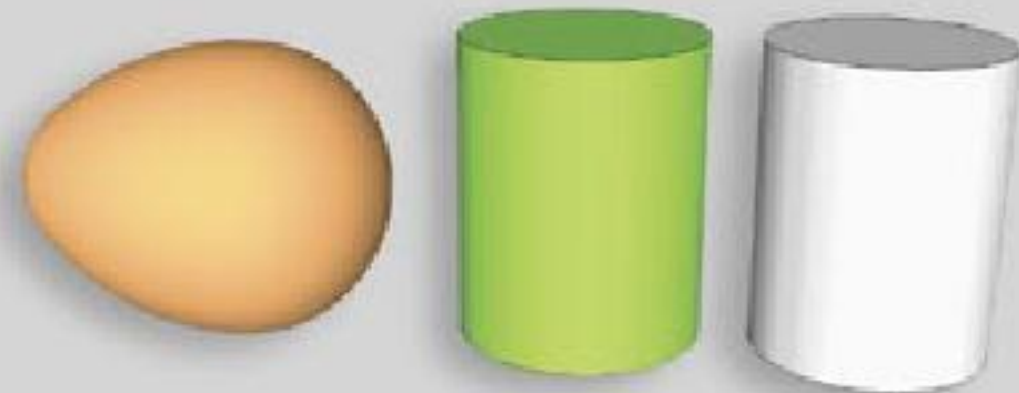
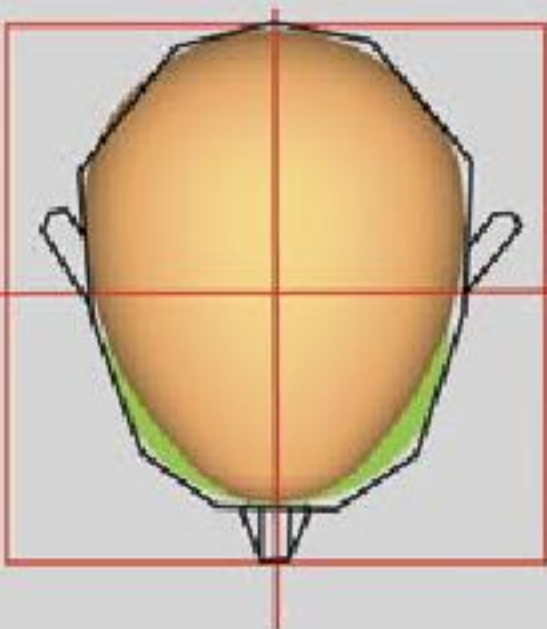
FRONT VIEW



SIDE VIEW



TOP VIEW



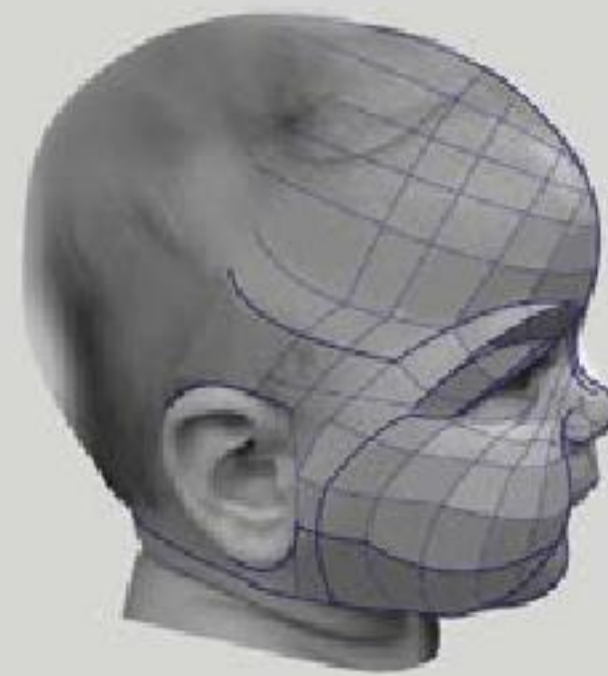
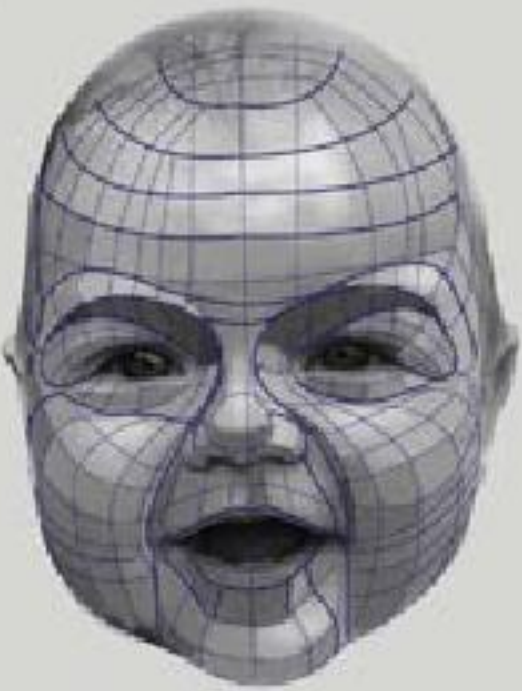


## BABY HEAD

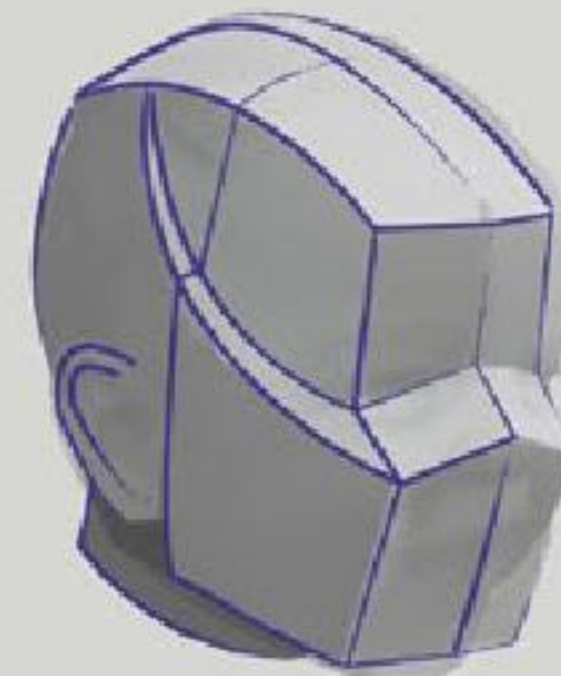
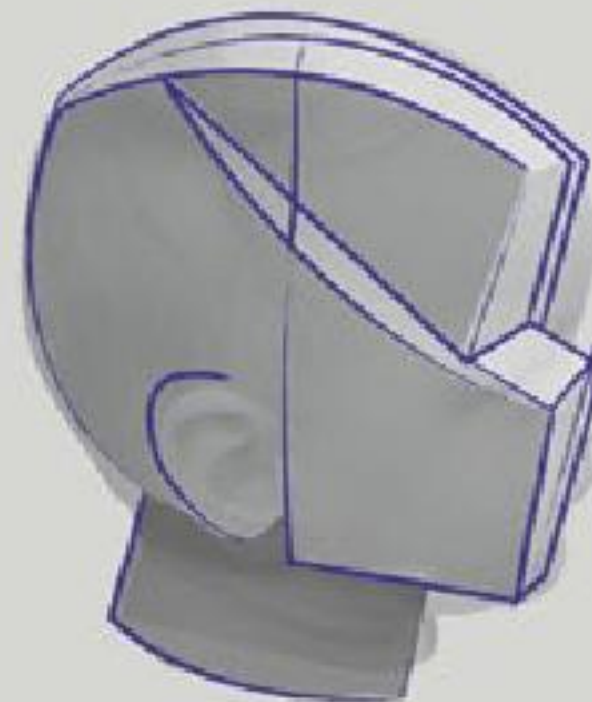
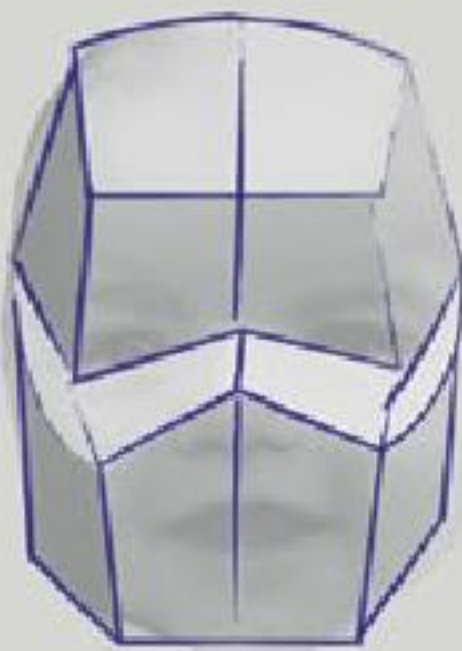
REAL



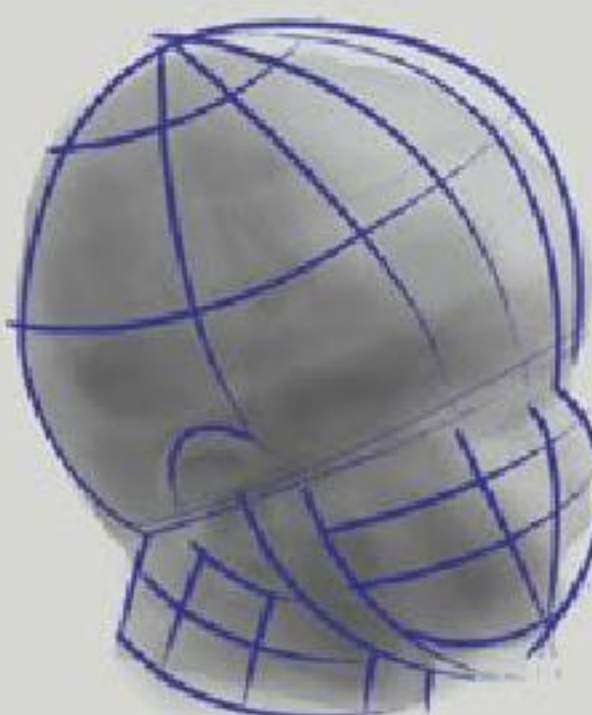
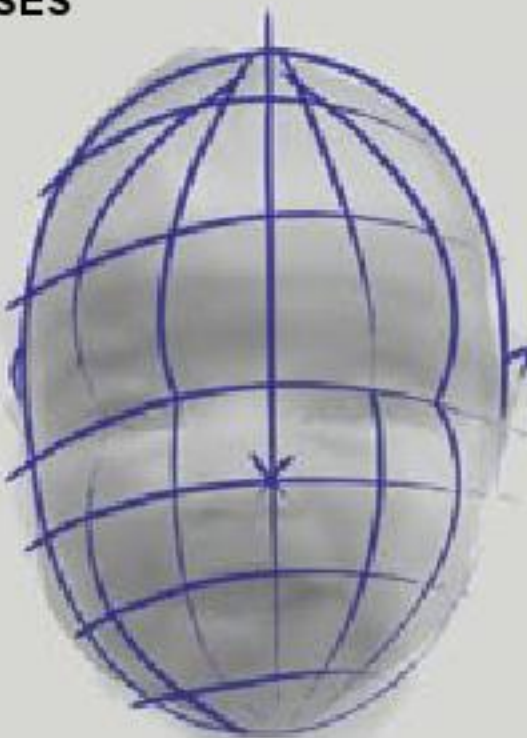
MESH



BLOCK-OUT



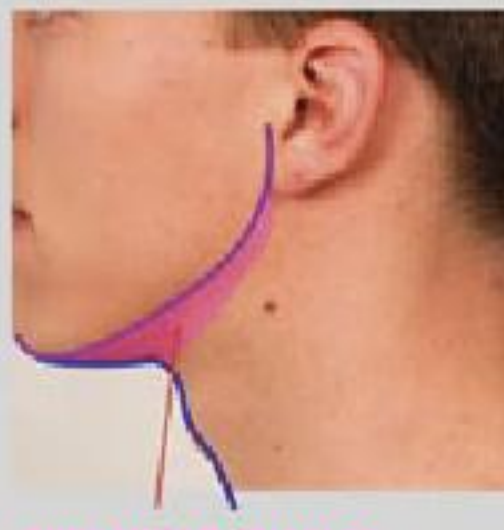
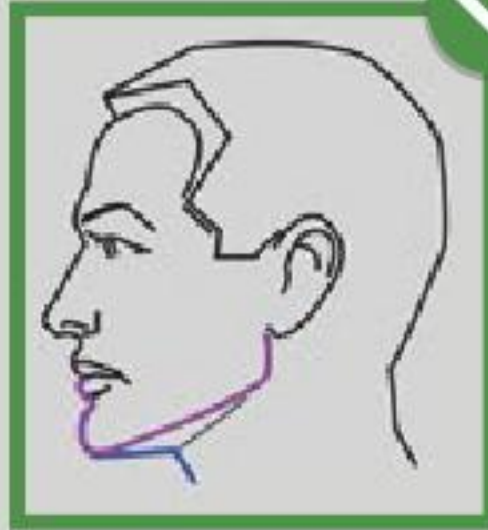
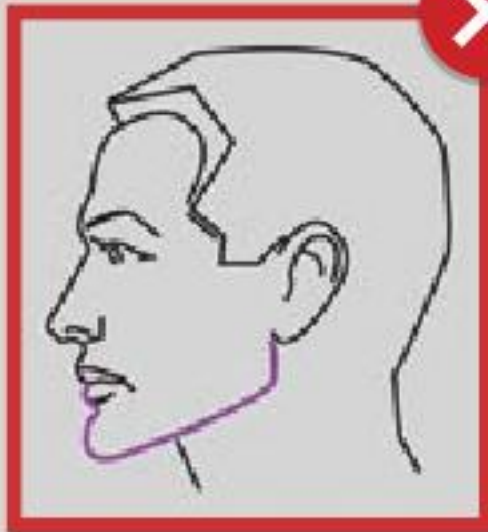
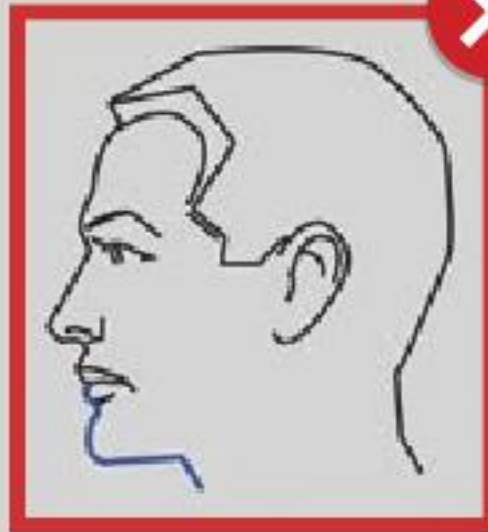
MASSES





## THE HEAD SHAPE

**CONTOUR OF THE CHIN**  
IS NOT THE SAME AS **JAWLINE**.

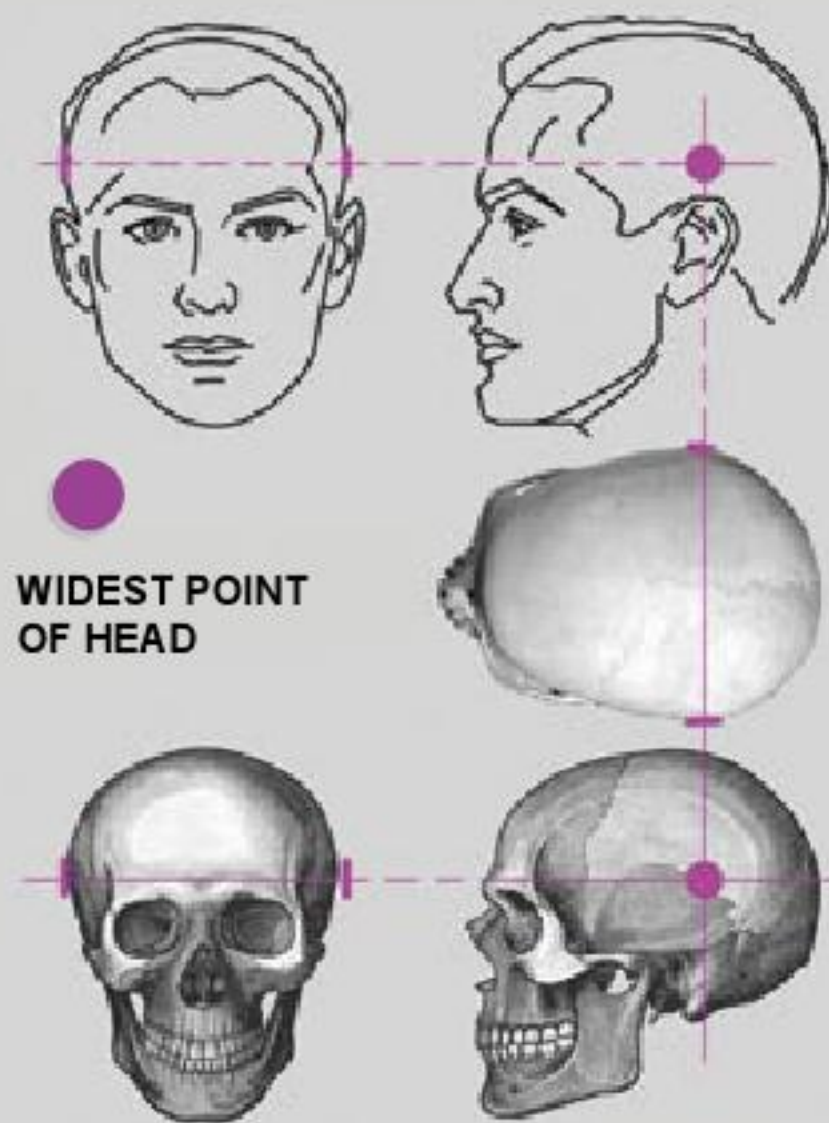


SUPRAHYOID MUSCLES

**TEMPORAL LINE** (THE EDGE BETWEEN  
TEMPORAL BONE AND FOREHEAD PLANE).

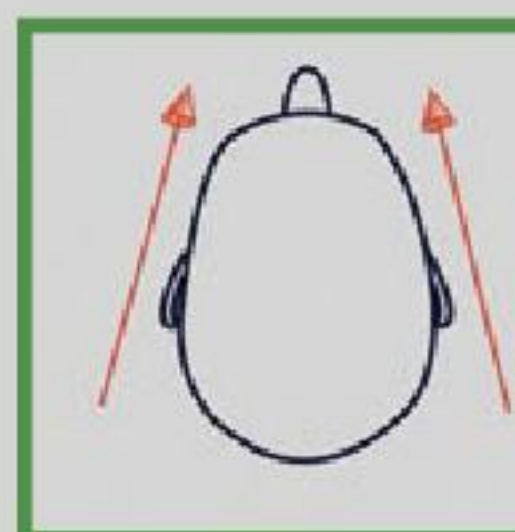
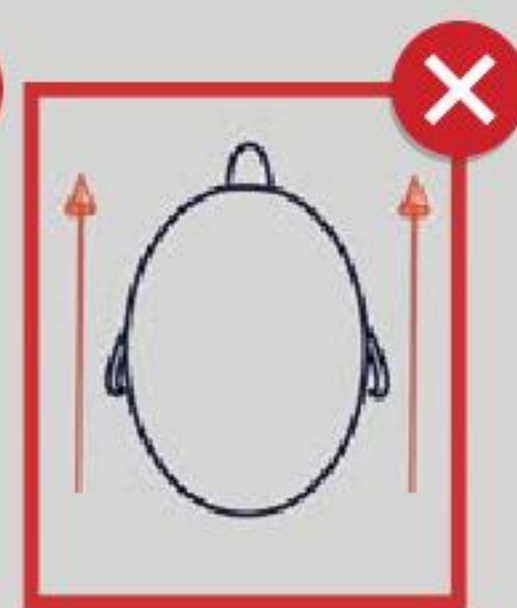


TEMPORAL MUSCLE



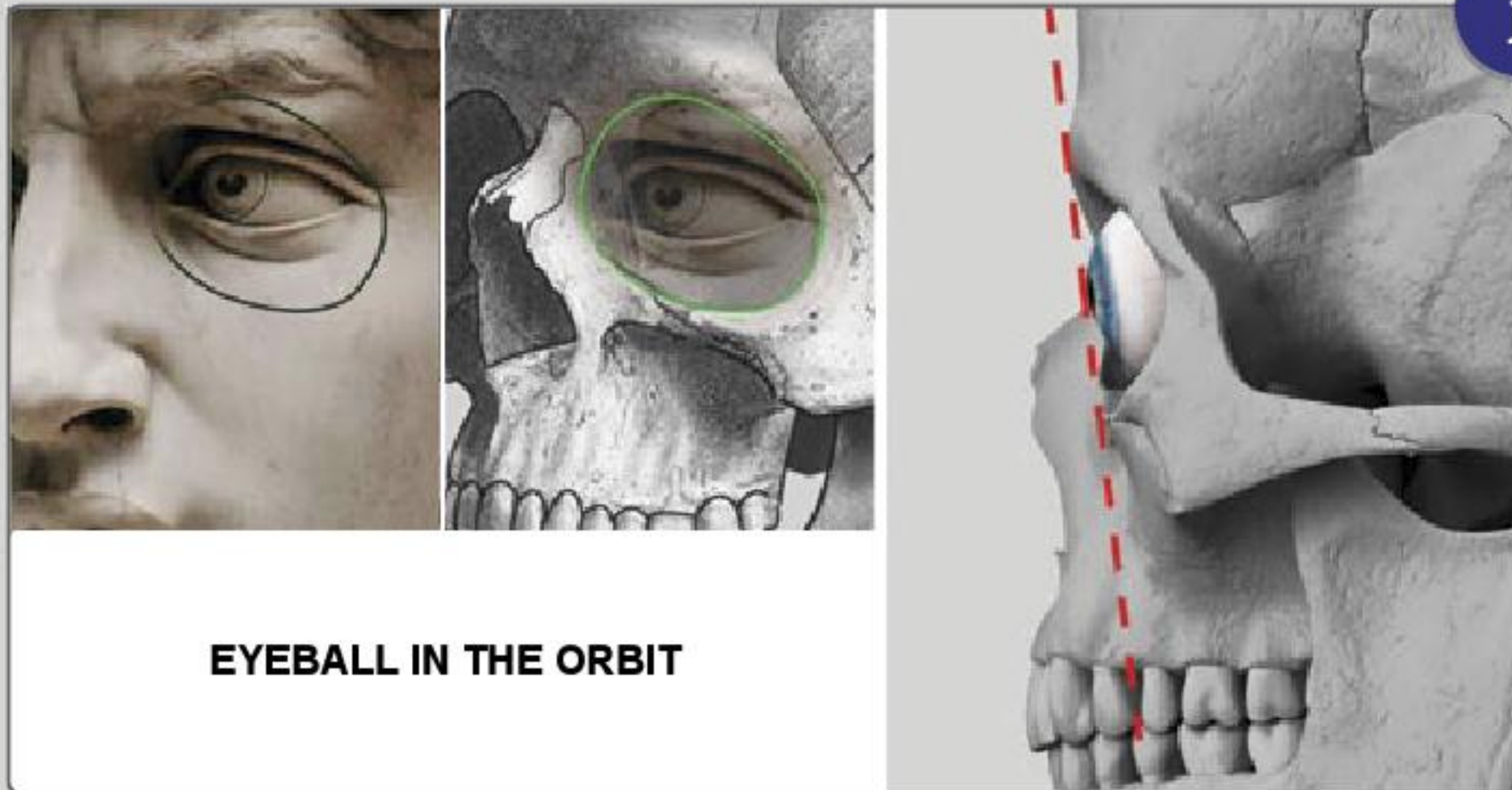
WIDEST POINT  
OF HEAD

**HEAD IS NOT ROUND.**





## FRAMING THE EYES

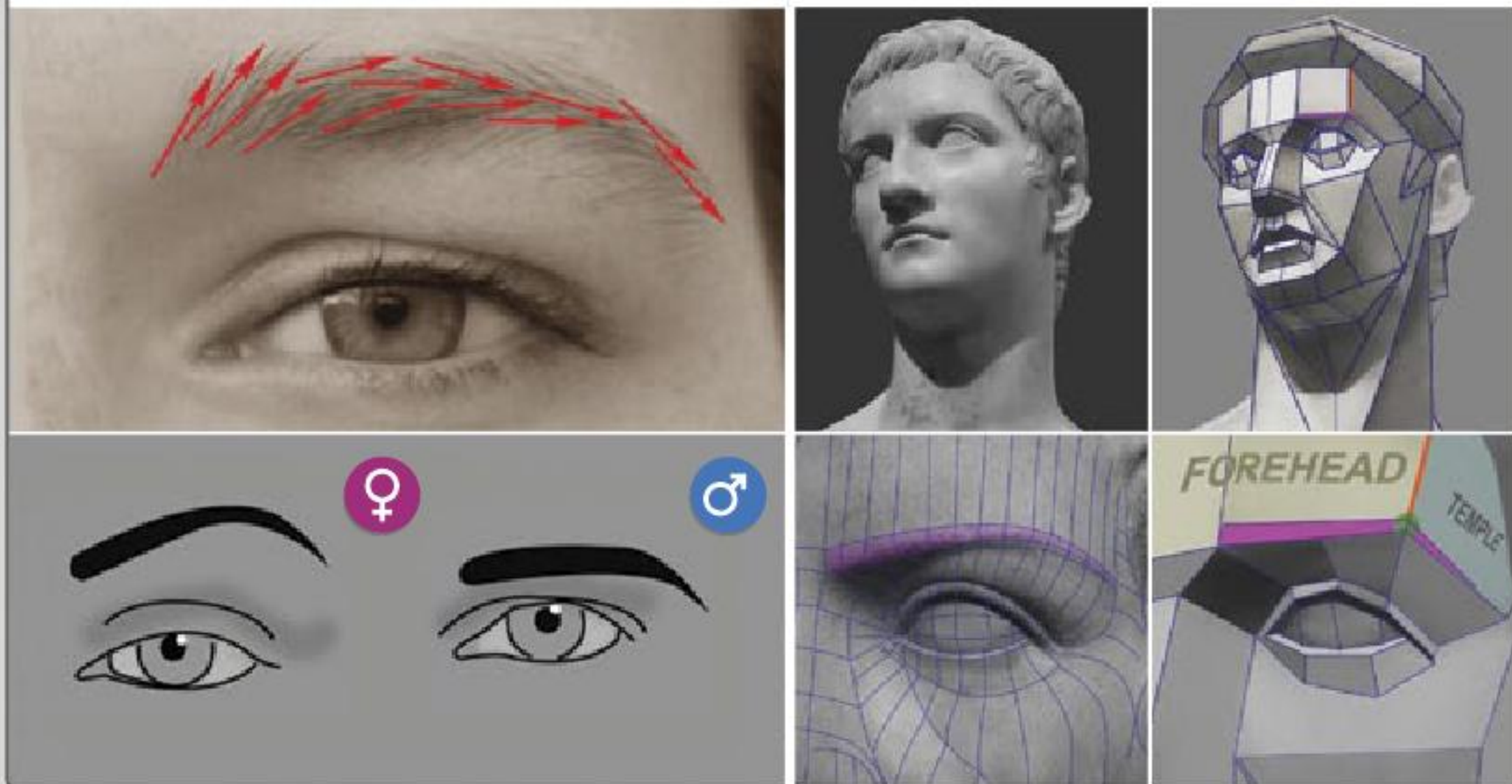


EYEBALL IN THE ORBIT

### EYEBROWS

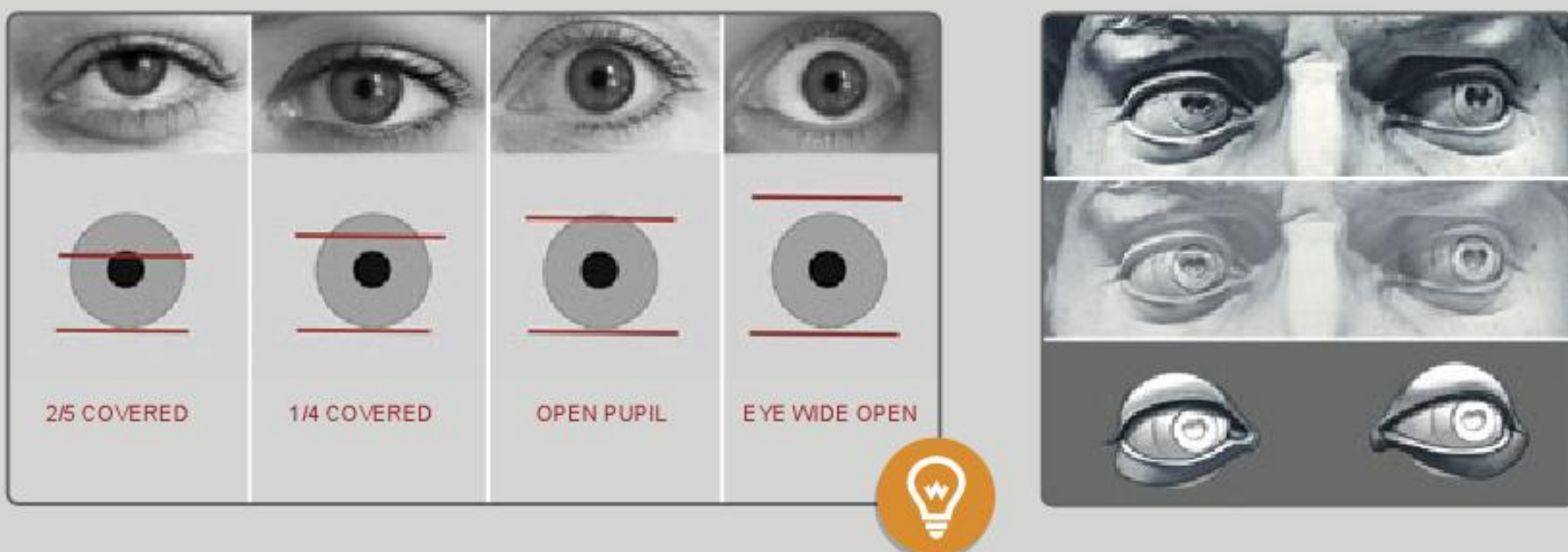
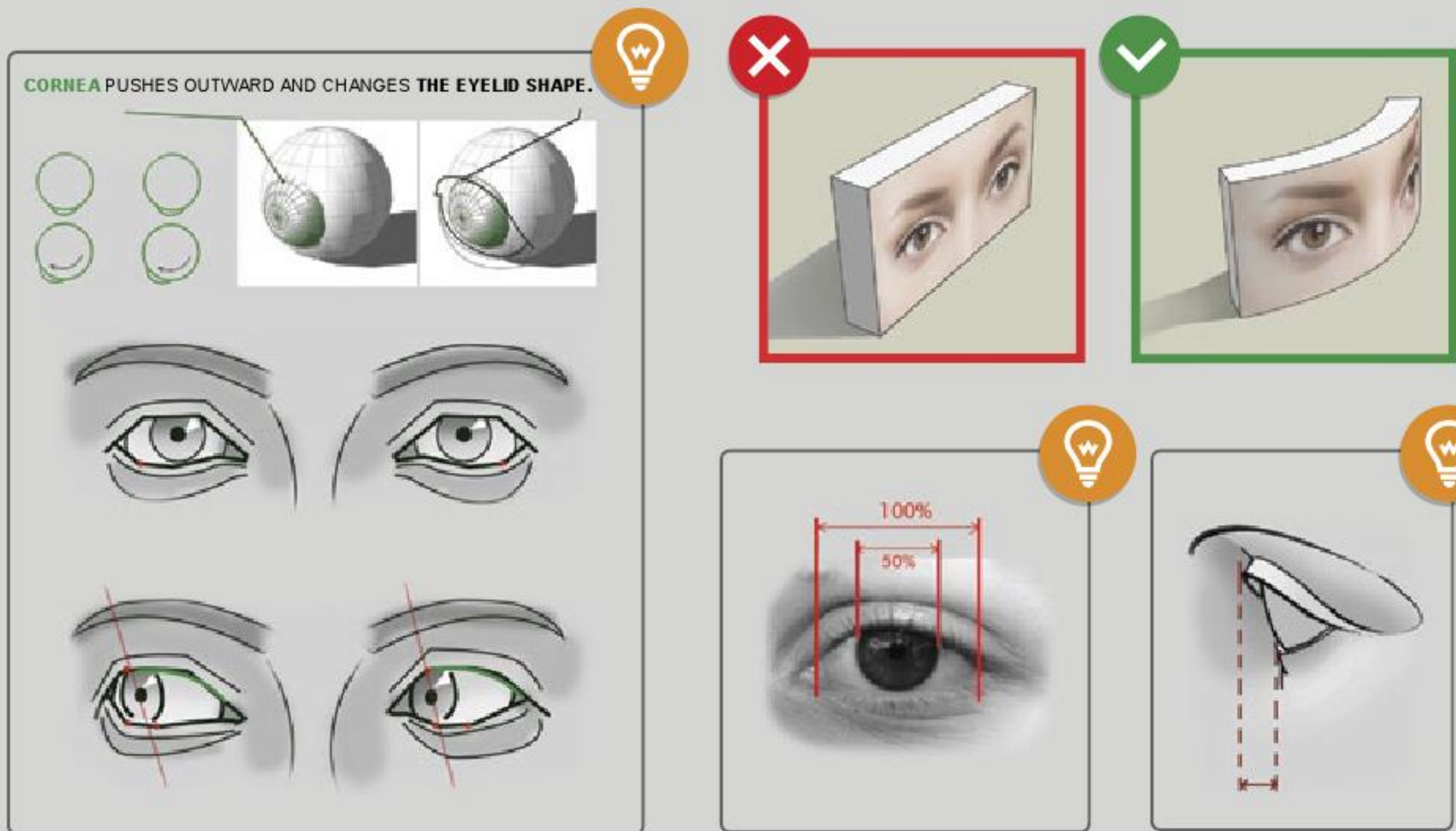
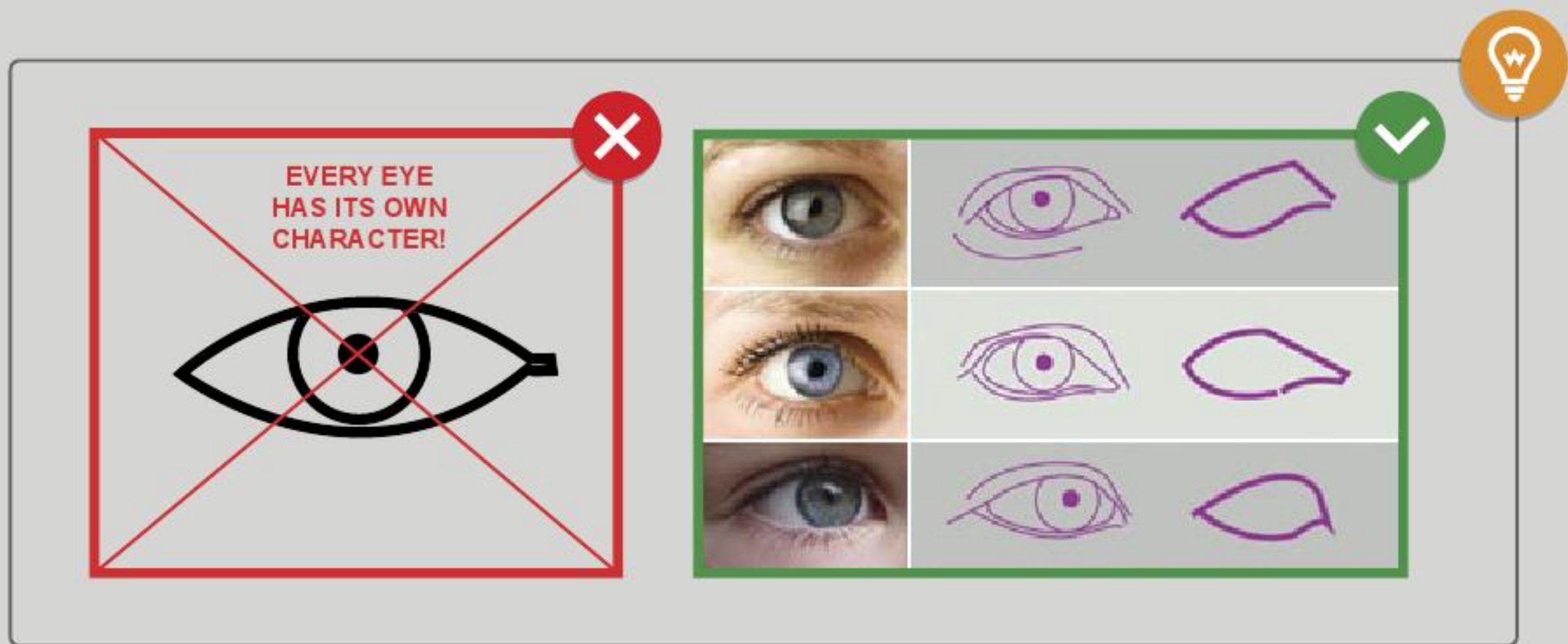


**EYEBROW** CHANGES DIRECTION AS IT RUNS ACROSS **THE TEMPORAL LINE**, SLOPING DOWN AND BACK TOWARD THE EAR.





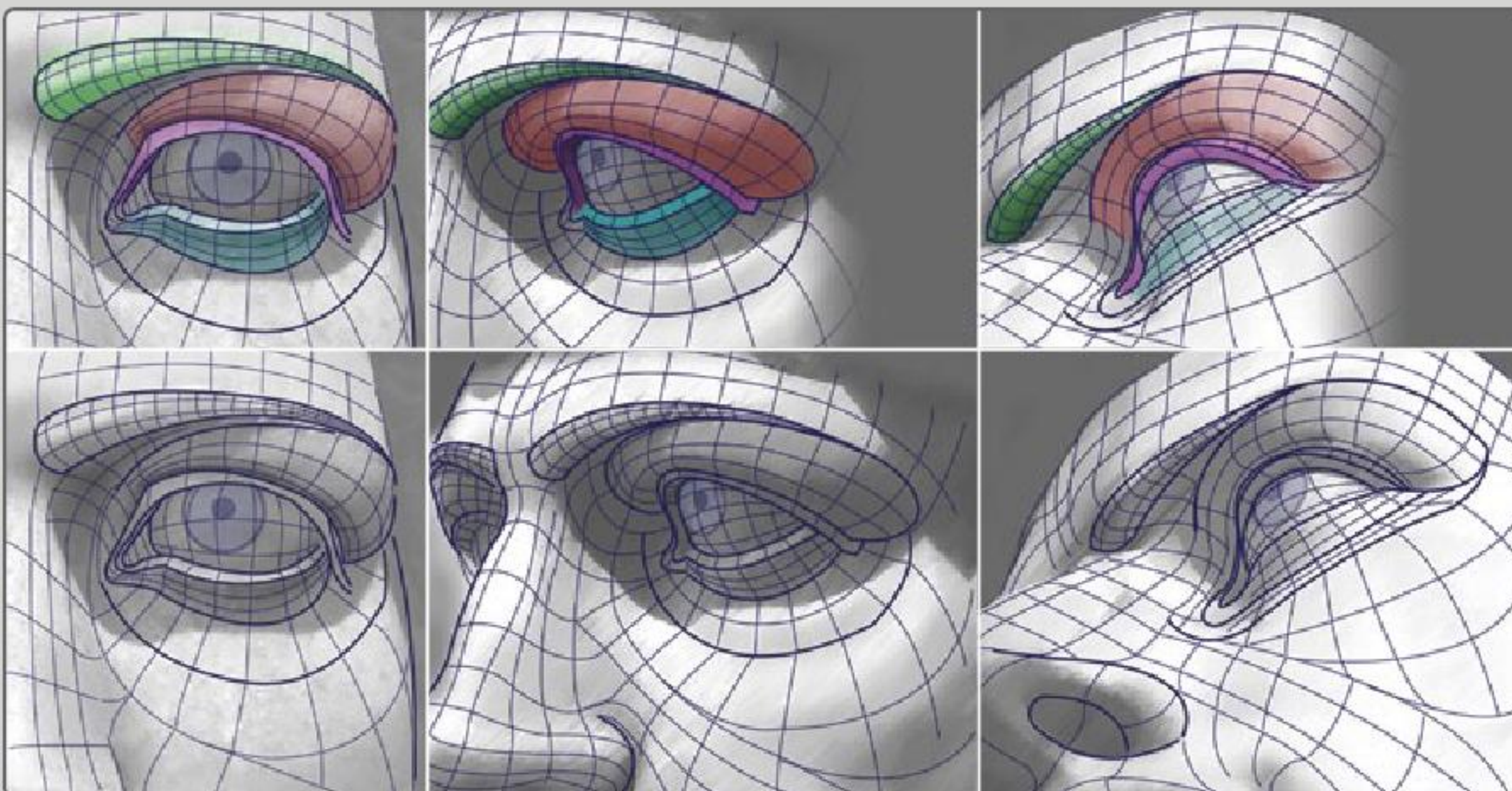
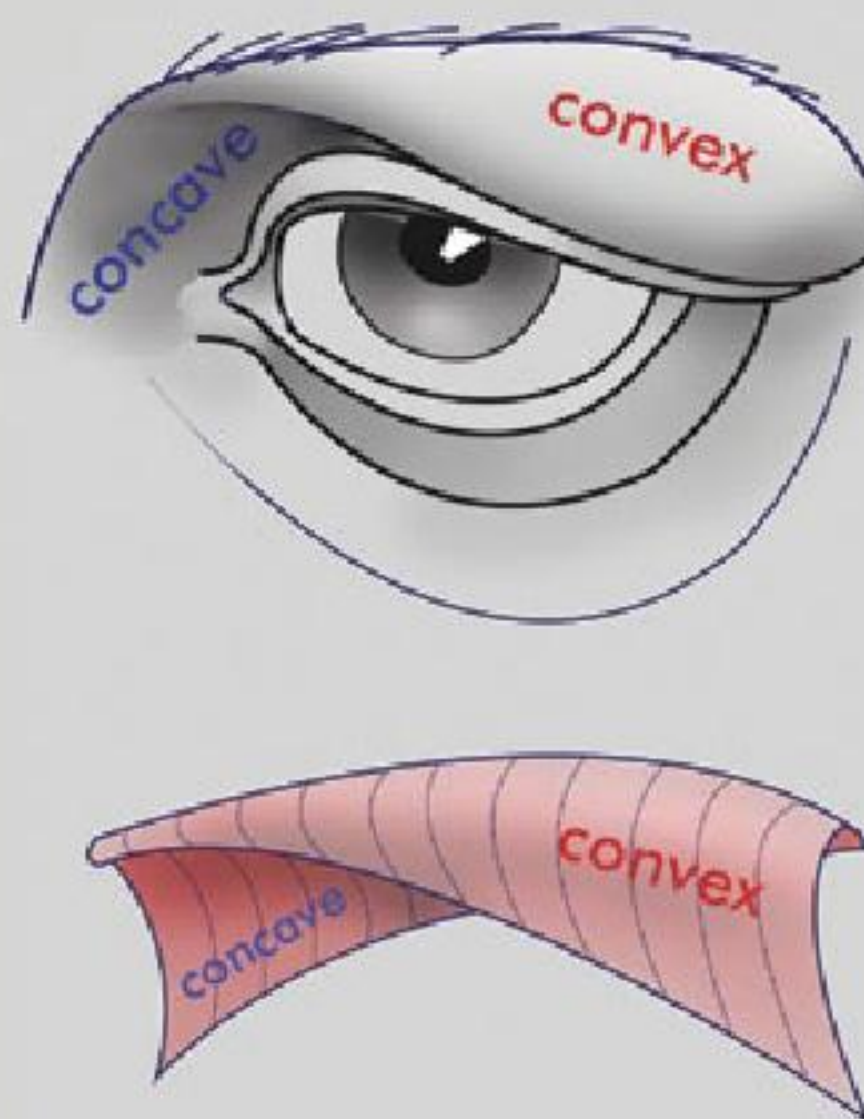
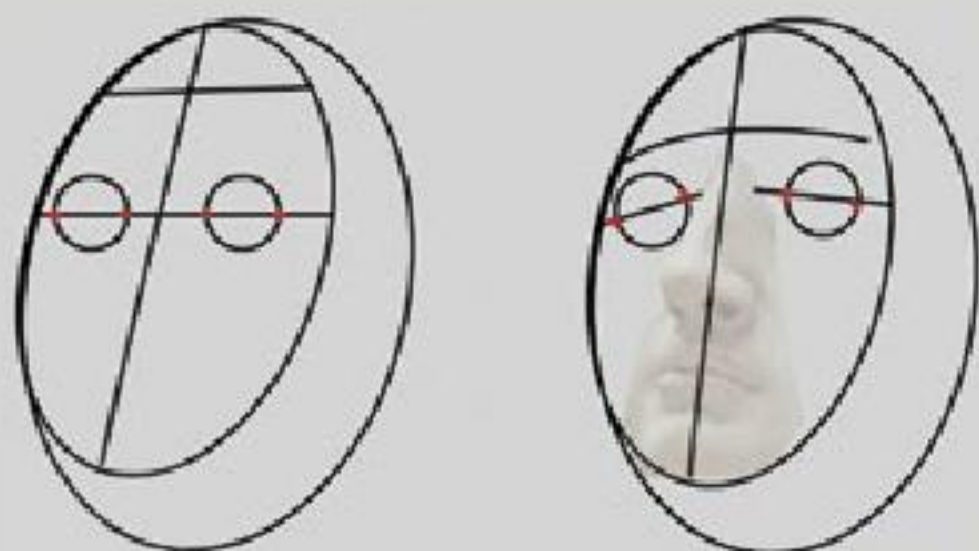
# ALL ABOUT EYES





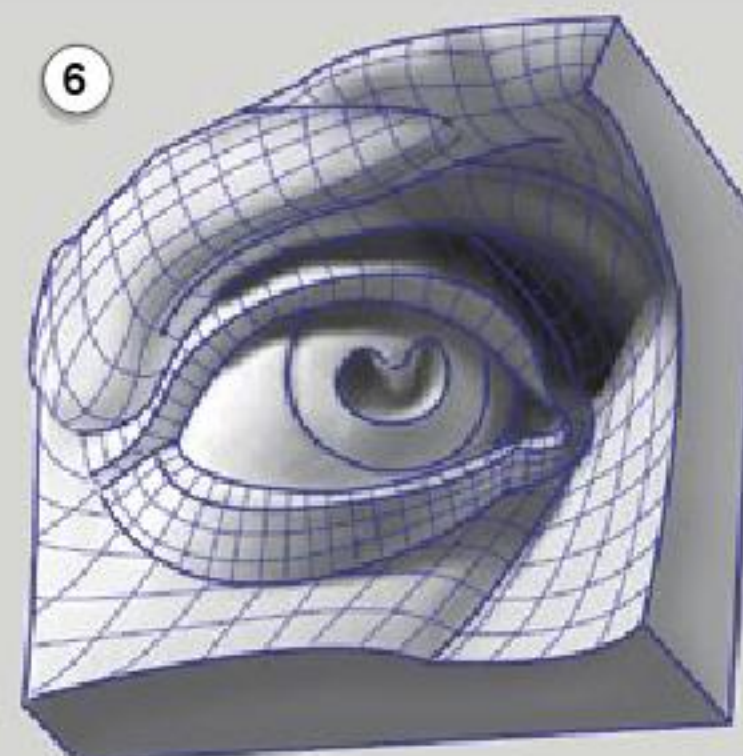
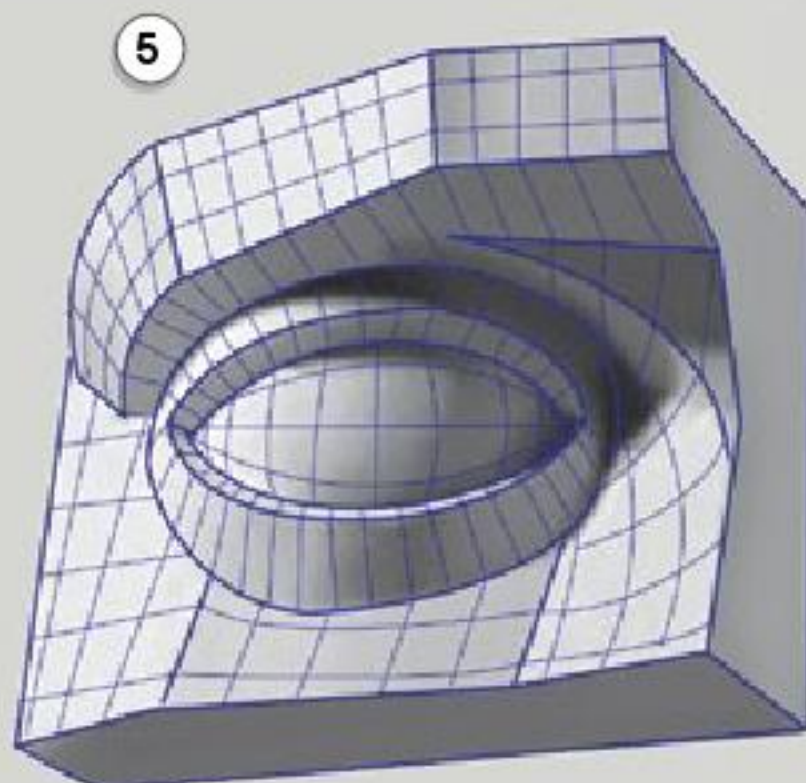
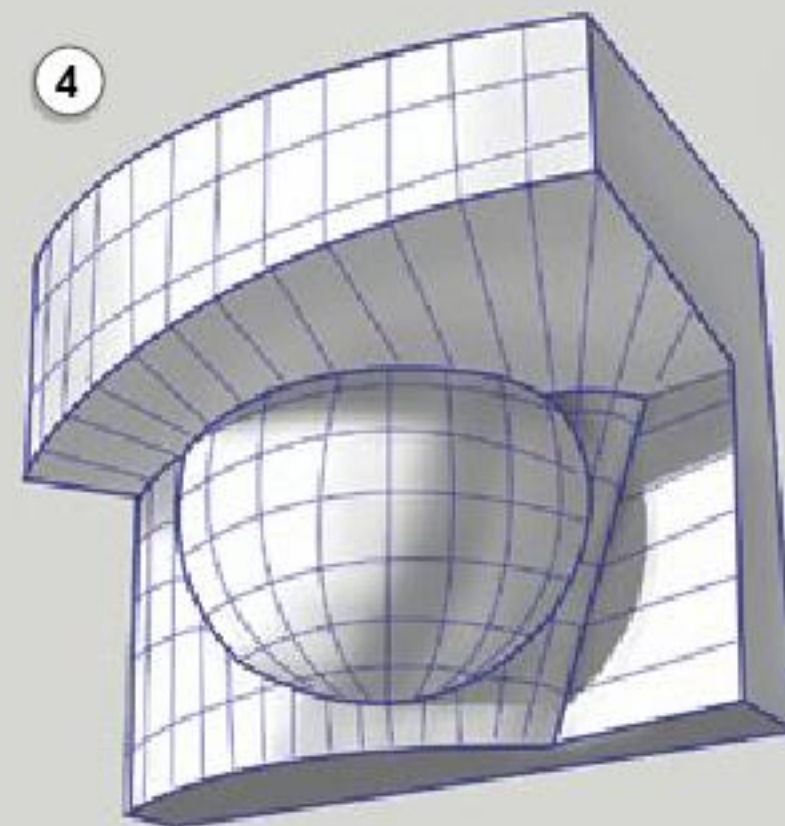
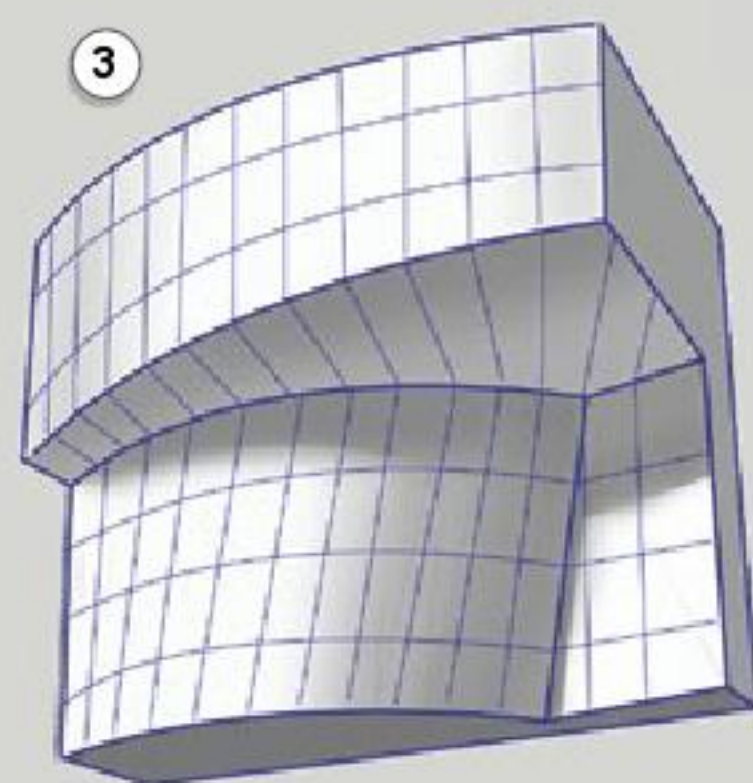
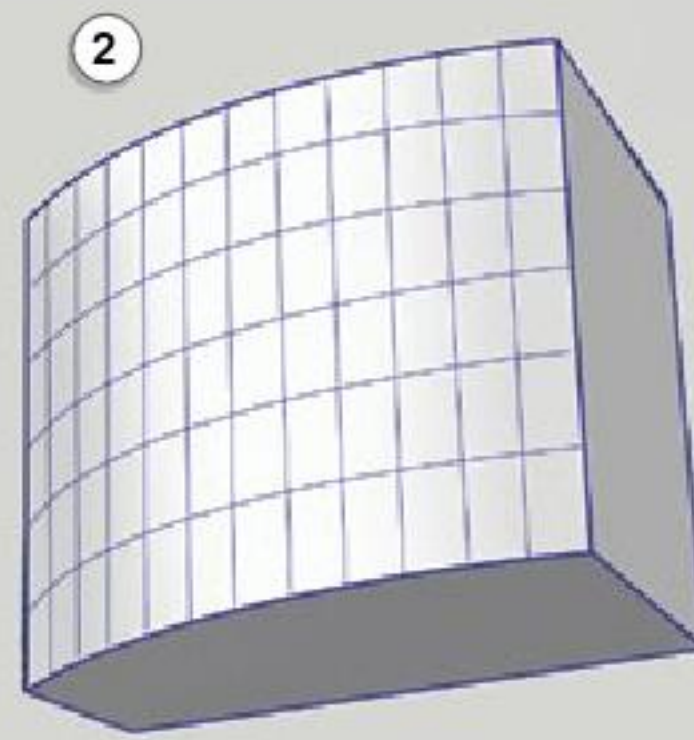
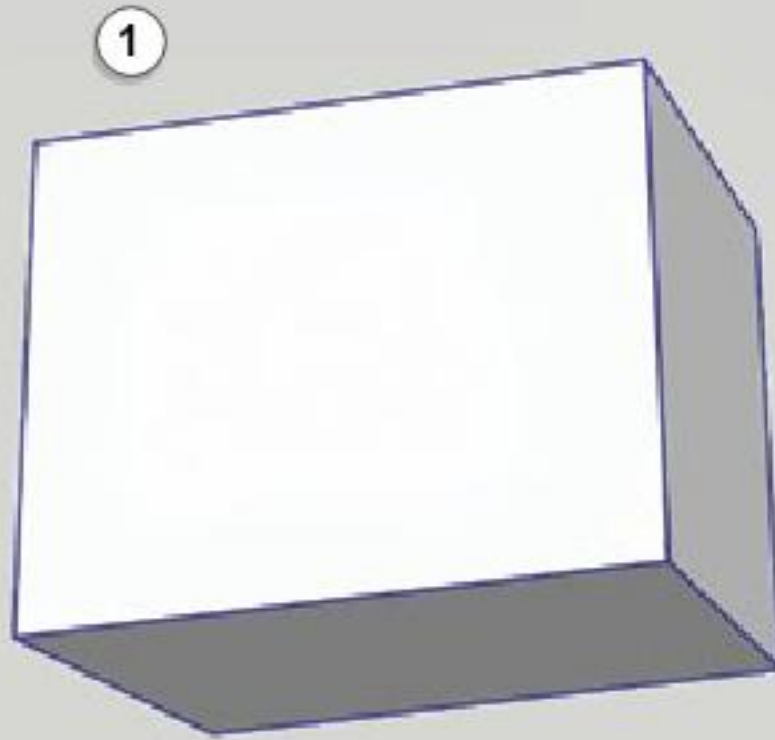
## EYE

WHAT MAKES A FACE LOOK FLAT?





## BLOCKING-OUT A CLASSICAL EYE (STEP-BY-STEP)





## EYES COME IN A VARIETY OF SHAPES

ADULT FEMALE



ADULT MALE



BABY



CHILD



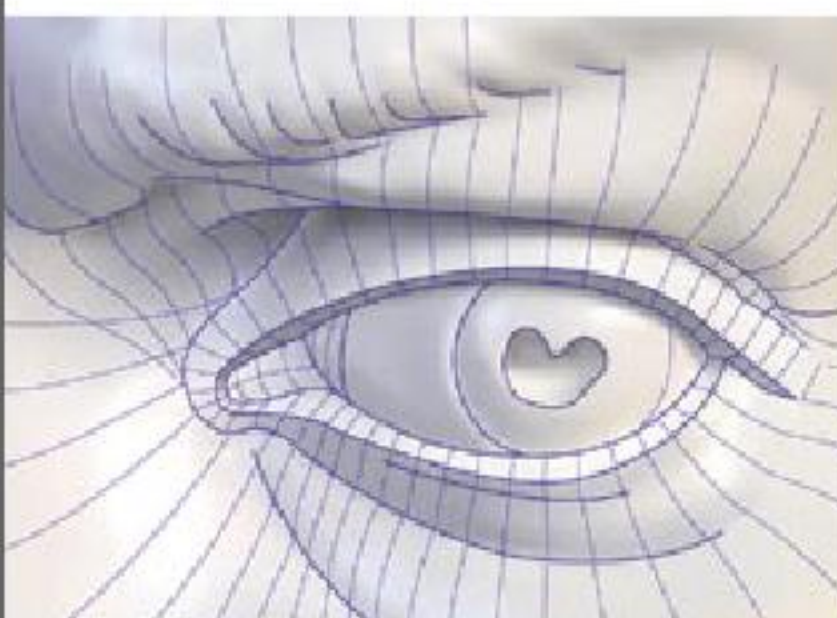
ASIAN



BLACK



CLASSICAL SCULPTURE



SENIOR





## EYE MOVEMENTS (EXPRESSIONS)





## EYE MOVEMENTS (EXPRESSIONS)

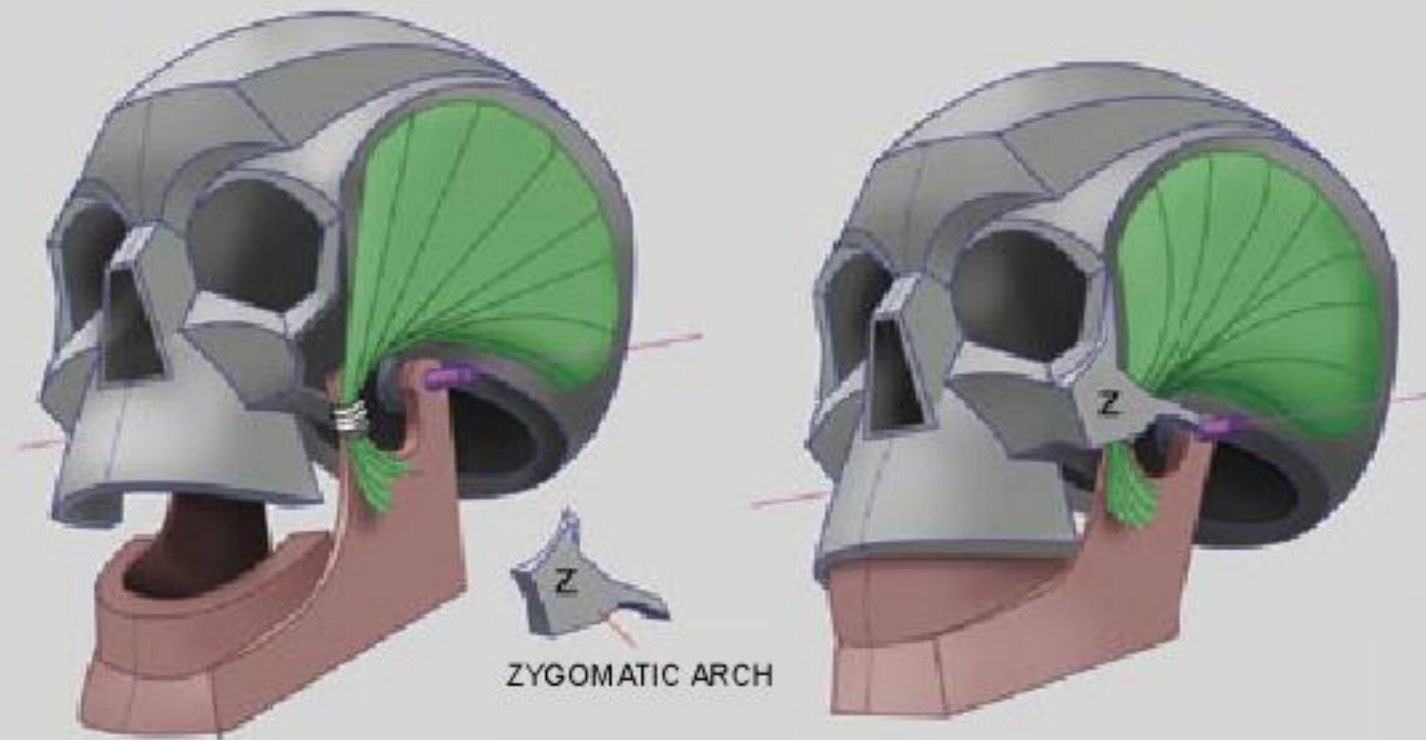




## WHAT STRONG JAWS YOU HAVE!

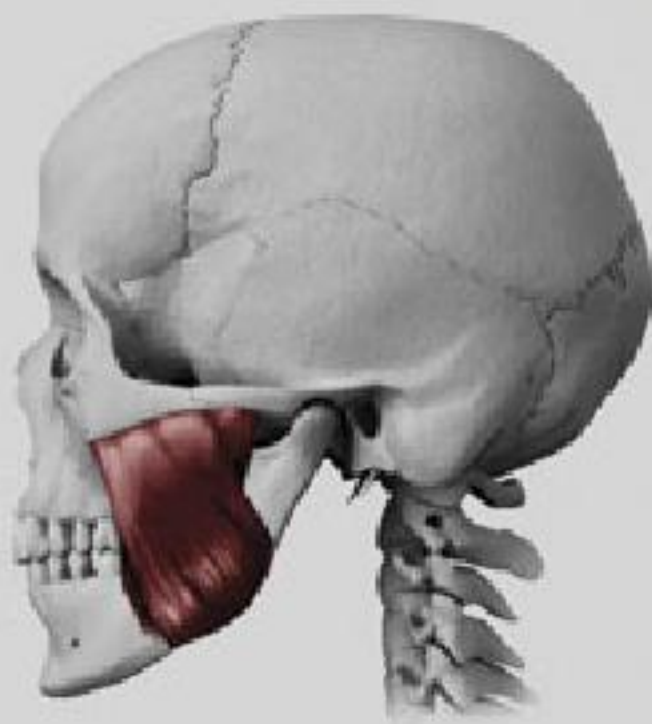
i

**TEMPORALIS MUSCLE** – HELPS TO CLOSE THE MOUTH AND KEEP IT SHUT!



i

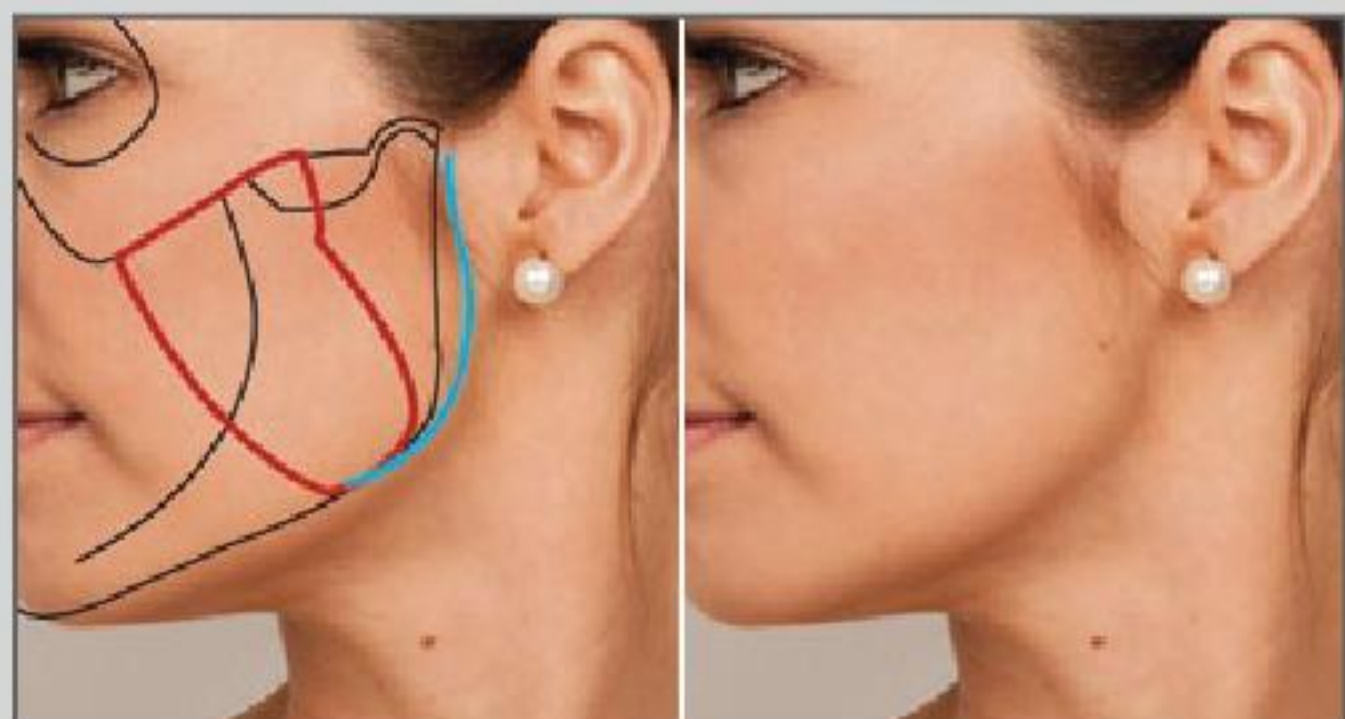
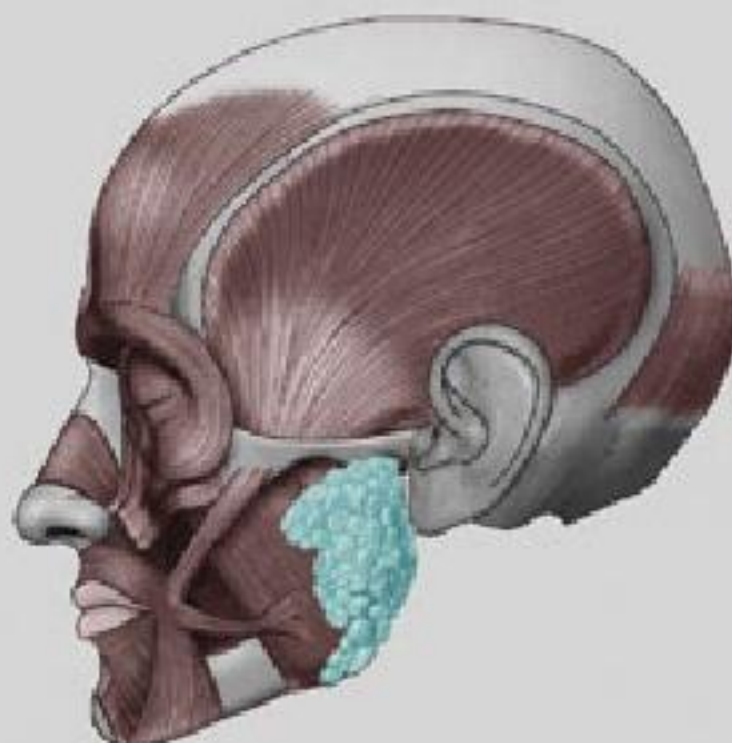
**THE CHEWING MUSCLE (MASSETER MUSCLE).**



IT IS THE PRIMARY CHEWING MUSCLE AND PULLS THE JAWS CLOSED. ITS OUTER PORTION ORIGINATES FROM THE ZYGOMATIC ARCH AND INSERTS ON THE SURFACE OF THE RAMUS OF THE MANDIBLE.

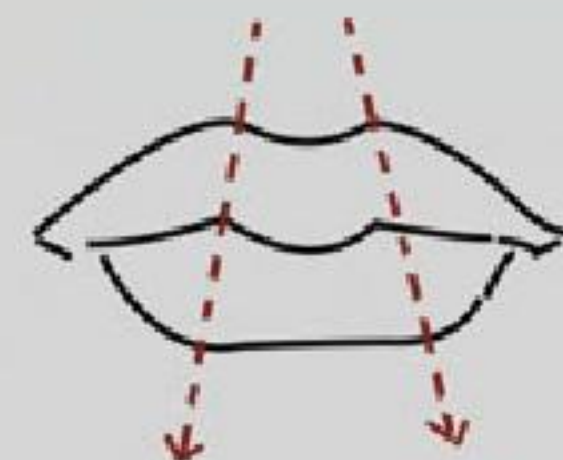
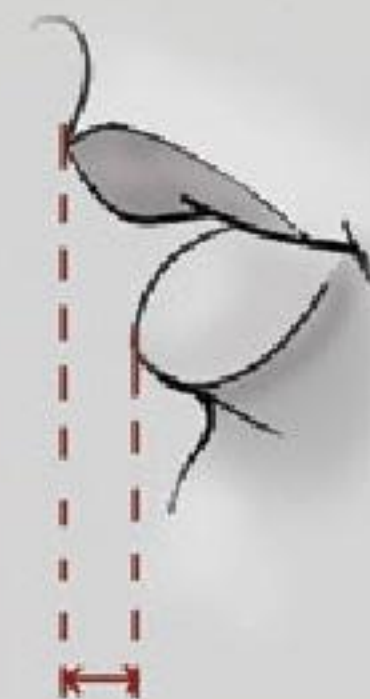
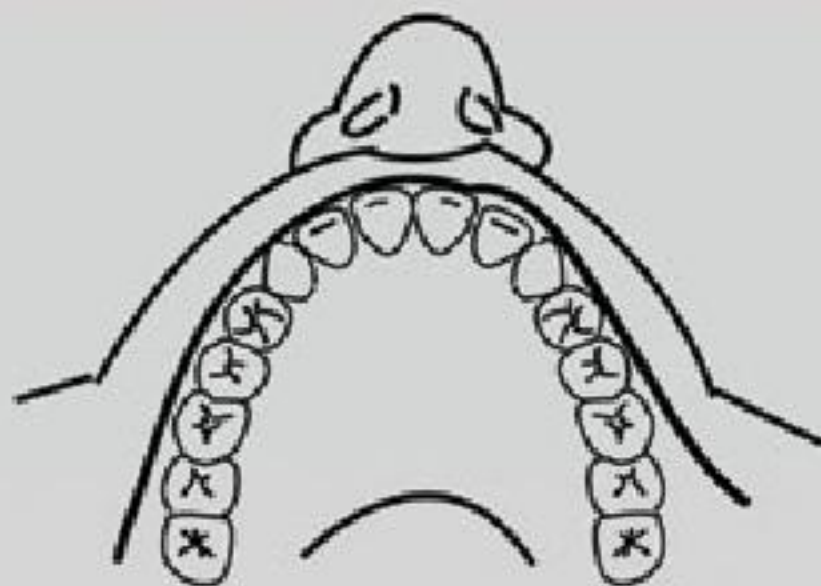
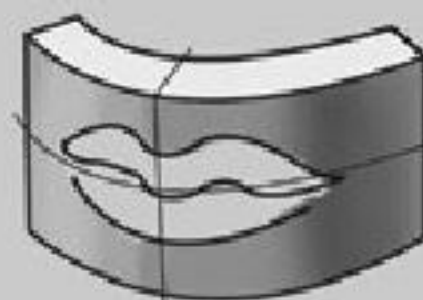
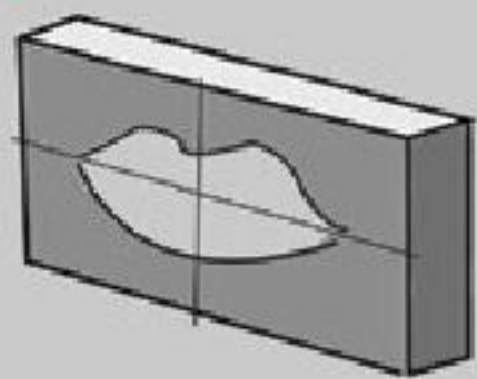
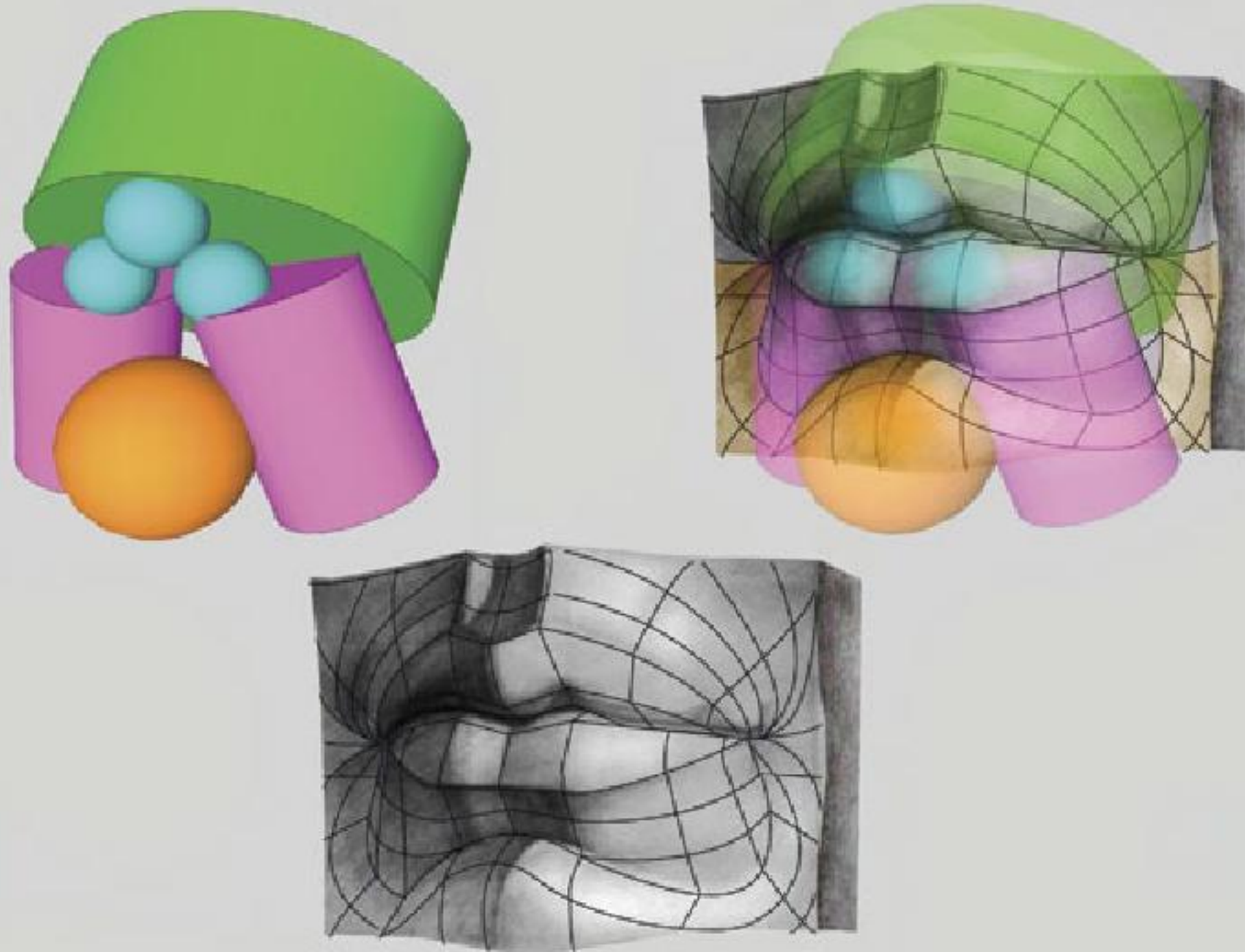
i

**PAROTID GLAND** (SALIVARY GLAND) ALSO PLAYS IMPORTANT ROLE IN SHAPING THE JAWLINE AND FACE.





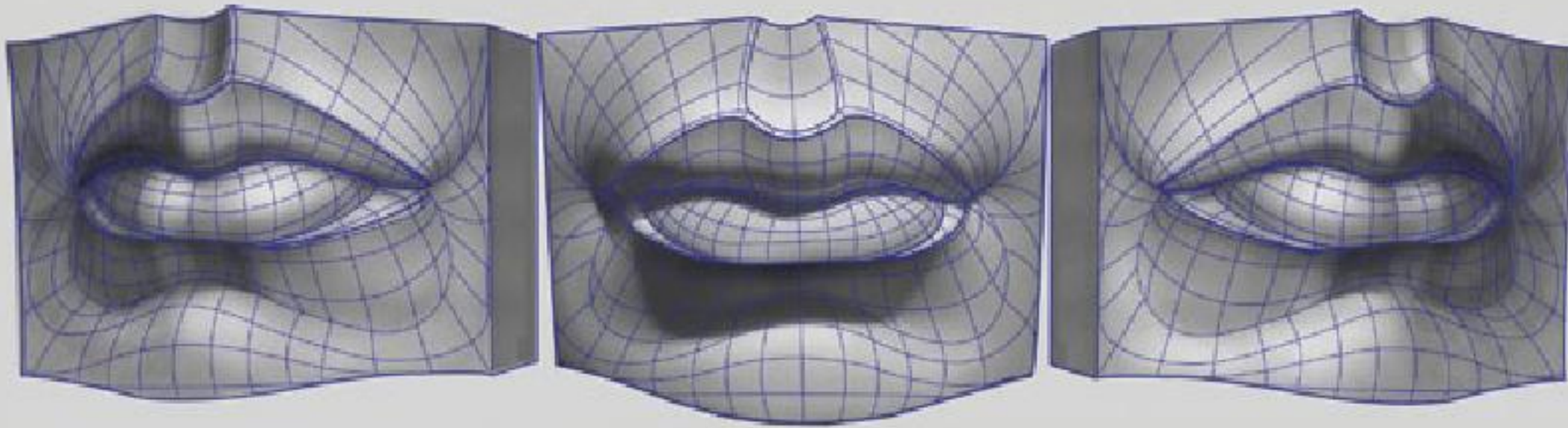
## UNDERSTANDING MOUTH CURVATURE



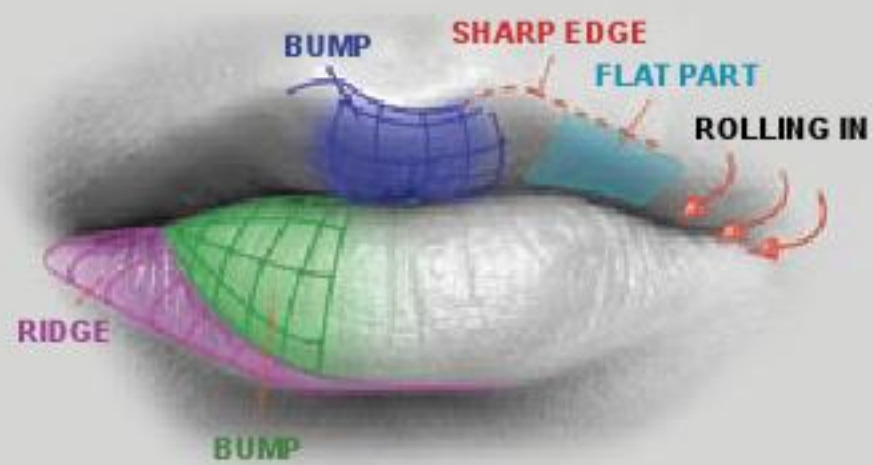


## SHAPE OF STILL LIPS

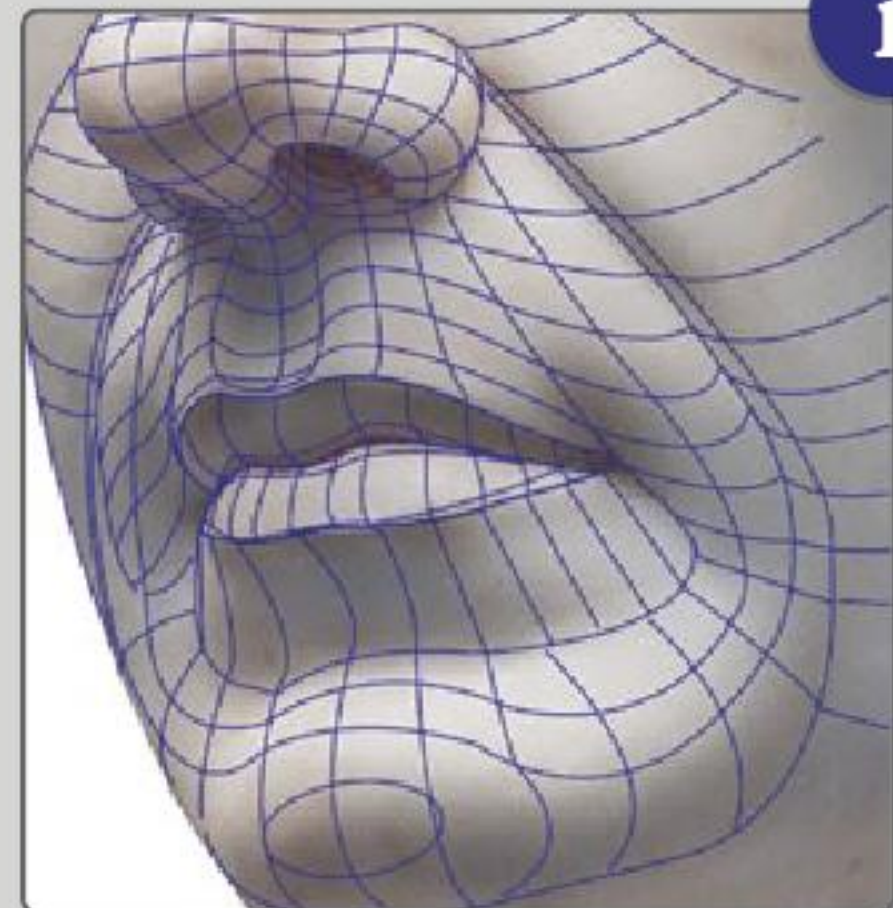
i



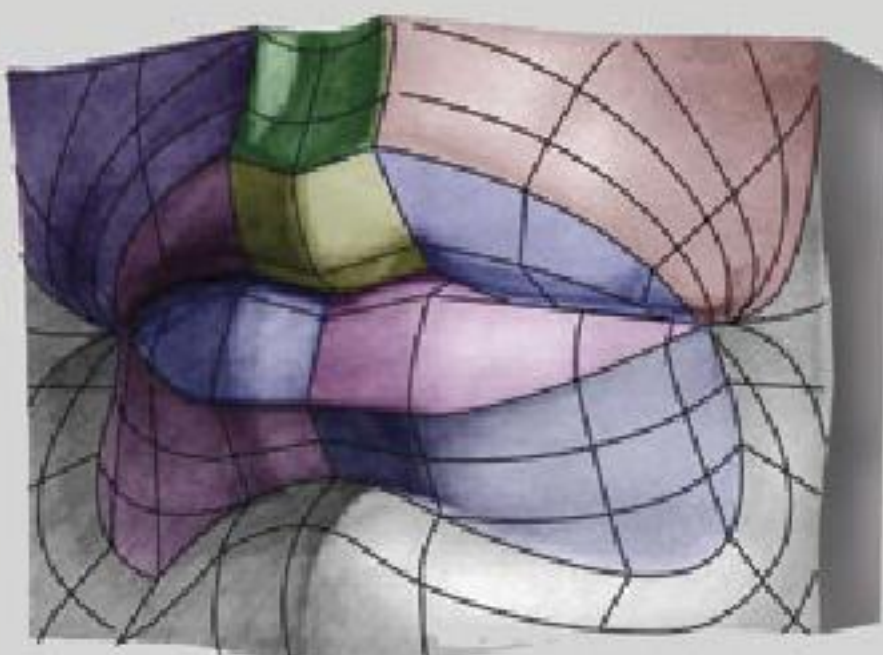
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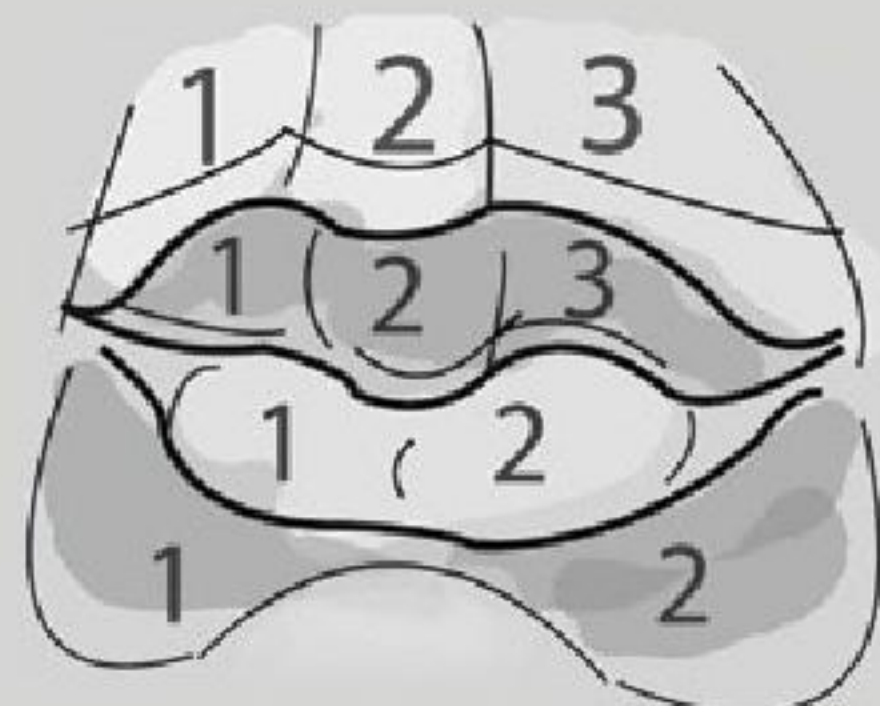
i



i



i





## MOUTH

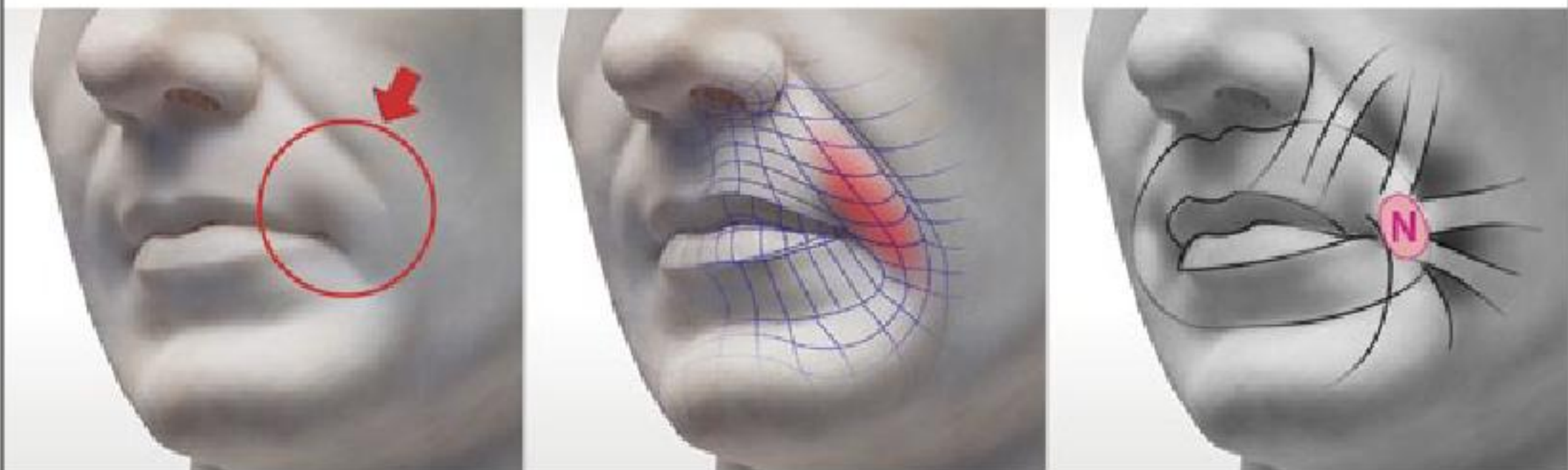
i

MOUTH EXPRESSIONS – IT'S ALL ABOUT PULLING AND SQUEEZING.



i

WHAT IS THIS BUMP?



IT IS CALLED THE **"NODE"**.

IT IS THE POINT WHERE SEVERAL FACIAL MUSCLES CONNECT TO THE CORNER OF THE MOUTH.



WHEN YOU SCULPT EXPRESSIONS, REMEMBER BONY LANDMARKS! BY PULLING IN DIFFERENT DIRECTIONS, THESE MUSCLES CREATE THE EXPRESSIONS, WHILE SKULL REMAINS THE SAME.





## MOUTH EXPRESSIONS





## MORE MOUTH EXPRESSIONS



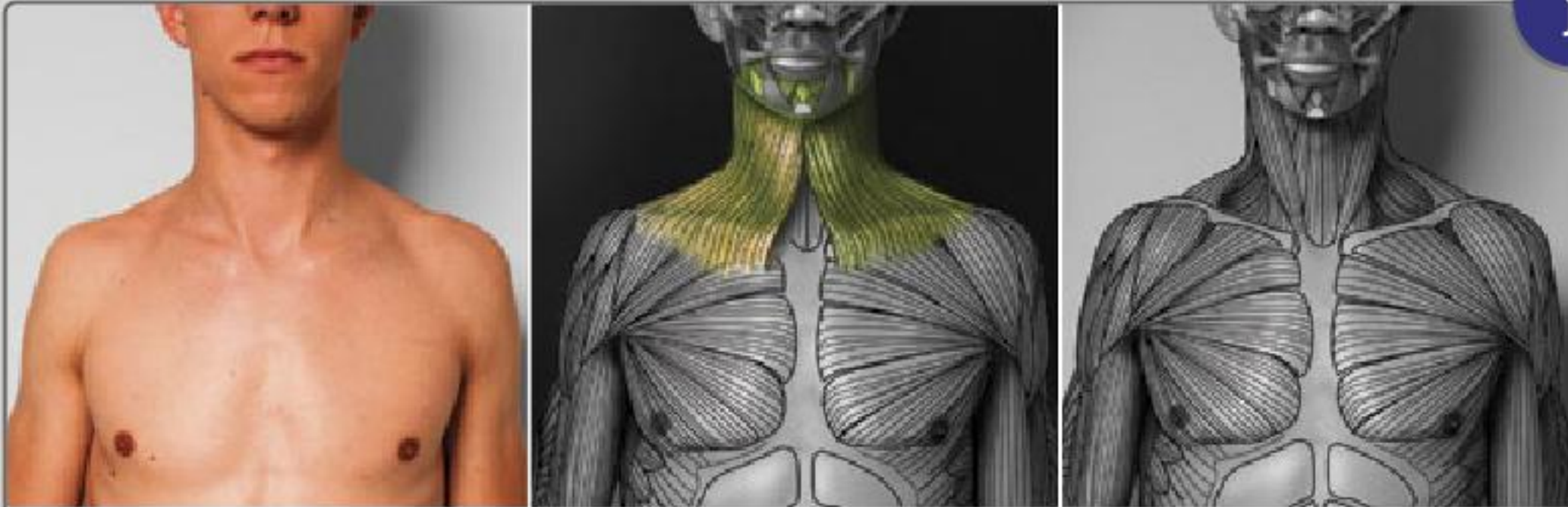


## EVEN MORE MOUTH EXPRESSIONS





## PLATYSMA MUSCLE



i

**THE PLATYSMA** IS A BROAD, THIN LAYER OF MUSCLE THAT IS SITUATED ON EACH SIDE OF THE NECK IMMEDIATELY UNDER THE SUPERFICIAL FASCIA.



i

**THE PLATYSMA** BELONGS TO THE GROUP OF FACIAL MUSCLES AND DRAWS THE CORNERS OF THE LOWER LIP AND MOUTH TO THE SIDES AND DOWNWARD. WHEN FLEXED FORCEFULLY, IT EXPANDS THE NECK AND DRAWS ITS SKIN UPWARD.



!

WEAKNESS OF THIS MUSCLE IS OFTEN THE MAJOR FACTOR IN CAUSING SAGGING UNDER THE CHIN IN OLDER PEOPLE (THIS IS NOT DUE TO AGING SKIN OR FROM FAT ACCUMULATION).



## STERNOCLEIDOMASTOID MUSCLE IN ACTION

i



HEAD UP (BN) ABOVE (BE)

BOTTOM OF NOSE (BN)

BOTTOM OF EAR (BE)



HEAD STRAIGHT (BN) LINED UP WITH (BE)

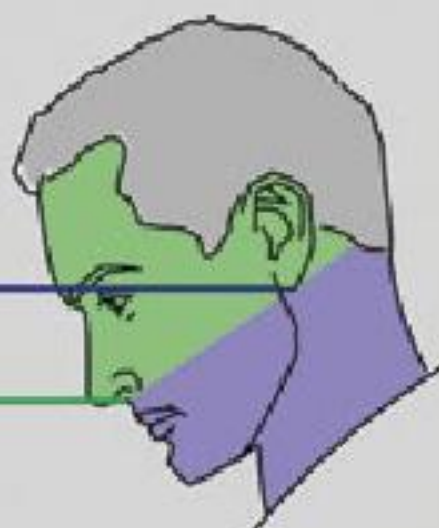
(BN) = (BE)



HEAD DOWN (BE) ABOVE (BN)

BOTTOM OF EAR (BE)

BOTTOM OF NOSE (BN)

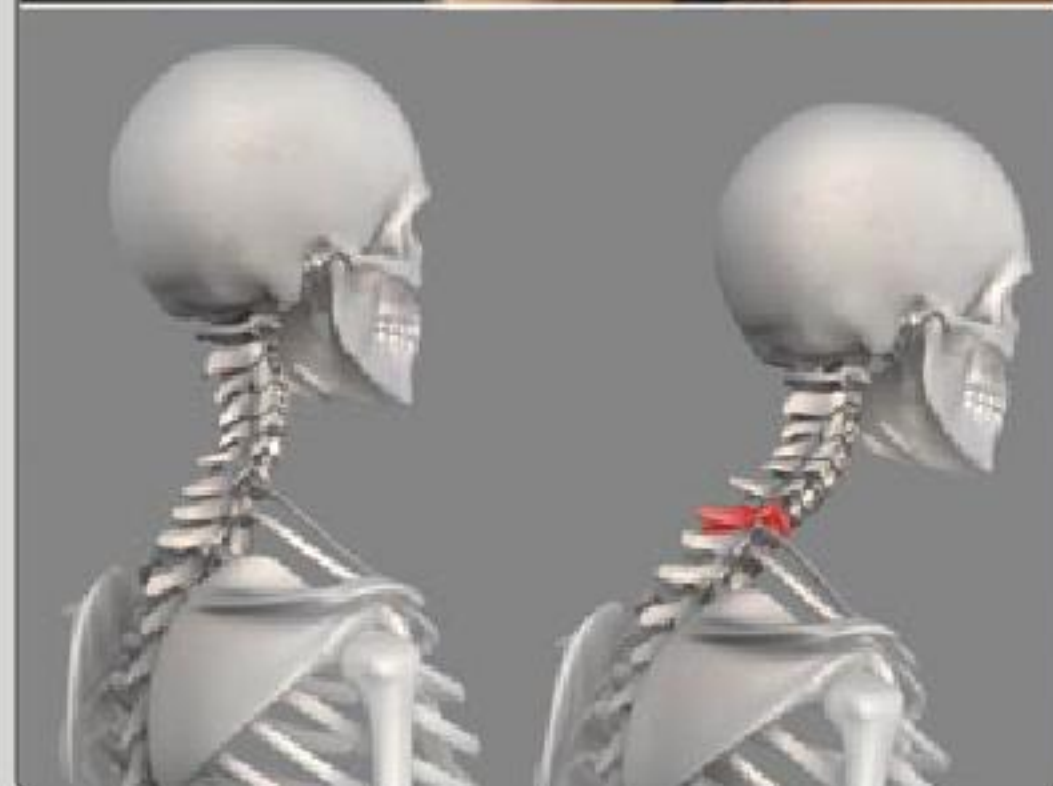


i

### 7TH CERVICAL VERTEBRAL BONE

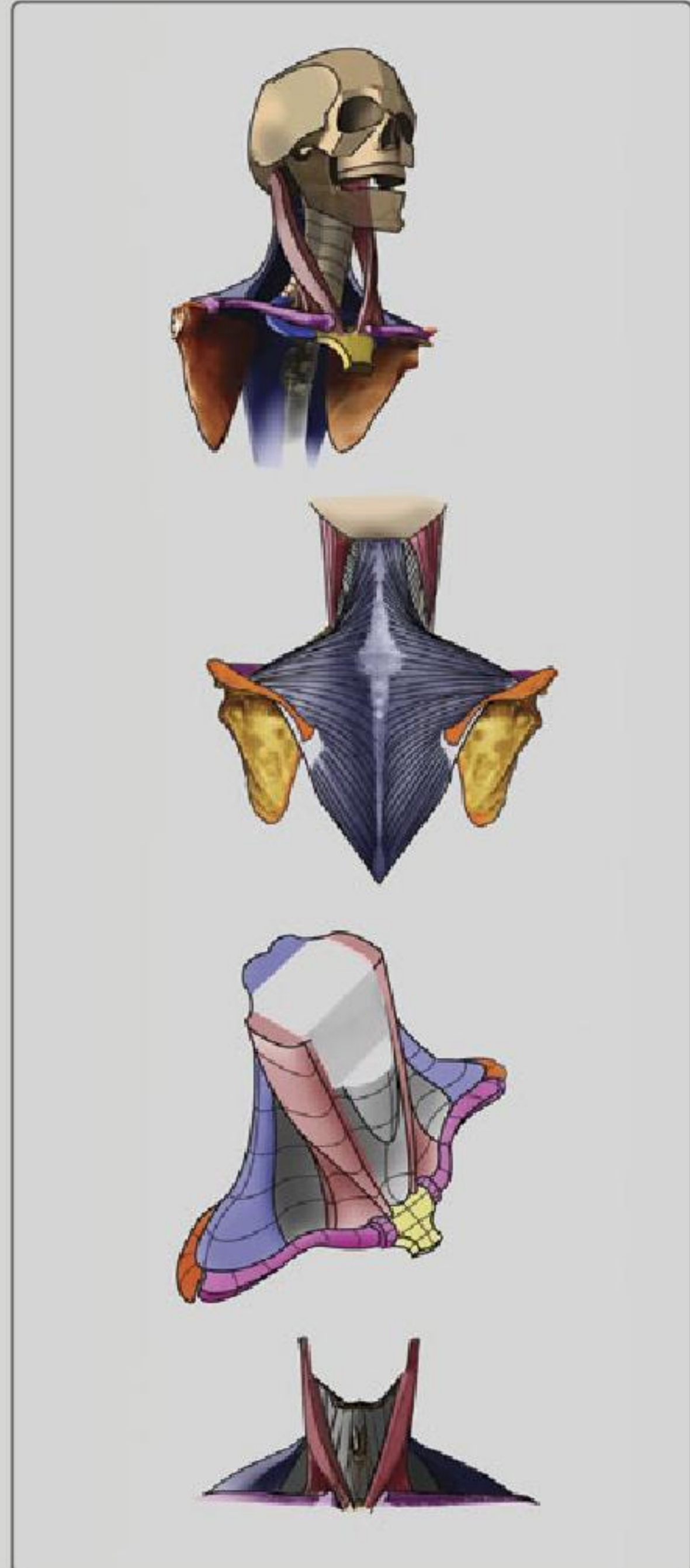
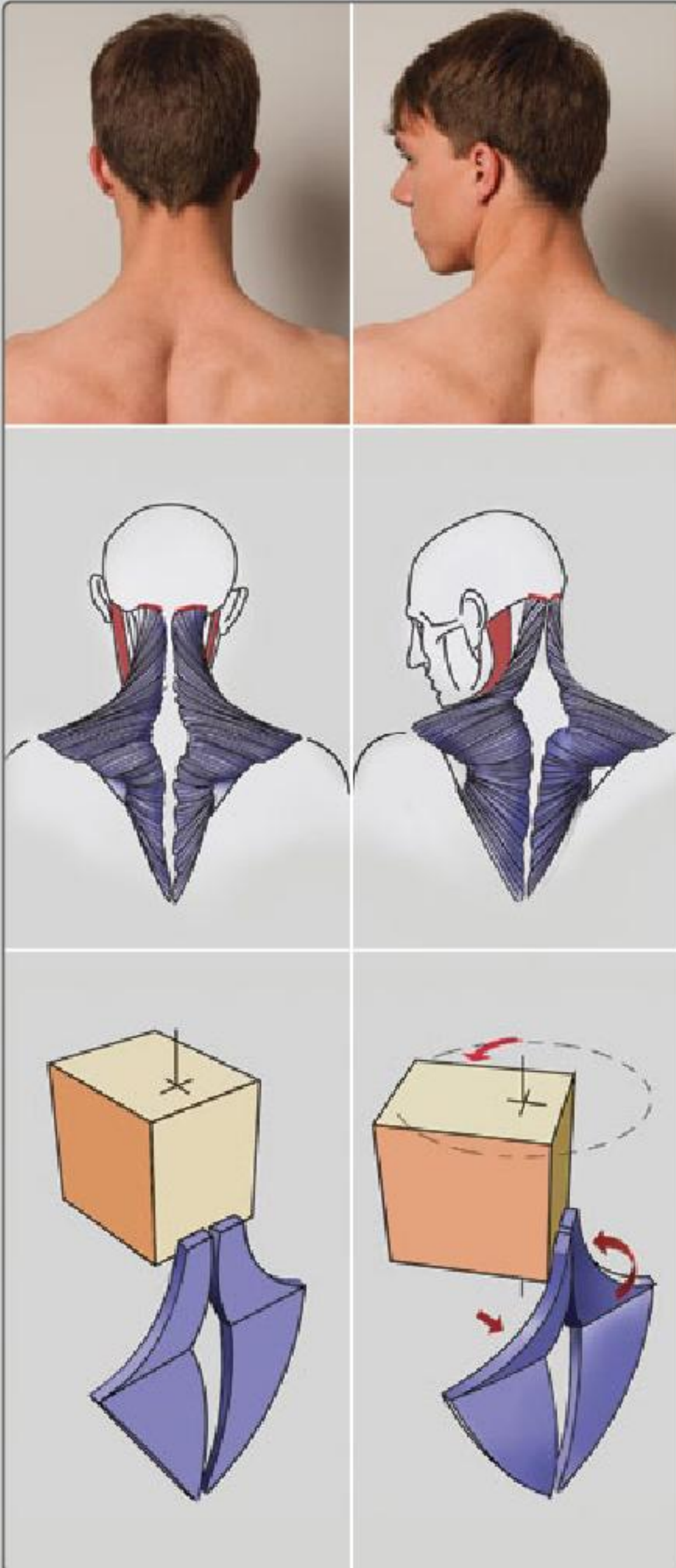
(WHERE THE NECK MEETS THE SHOULDERS).

WHEN HEAD IS BENT FORWARD, YOU CAN SEE PROMINENT VERTEBRA AT THE TOP OF THE SPINE PROTRUDING OUTWARD SLIGHTLY.



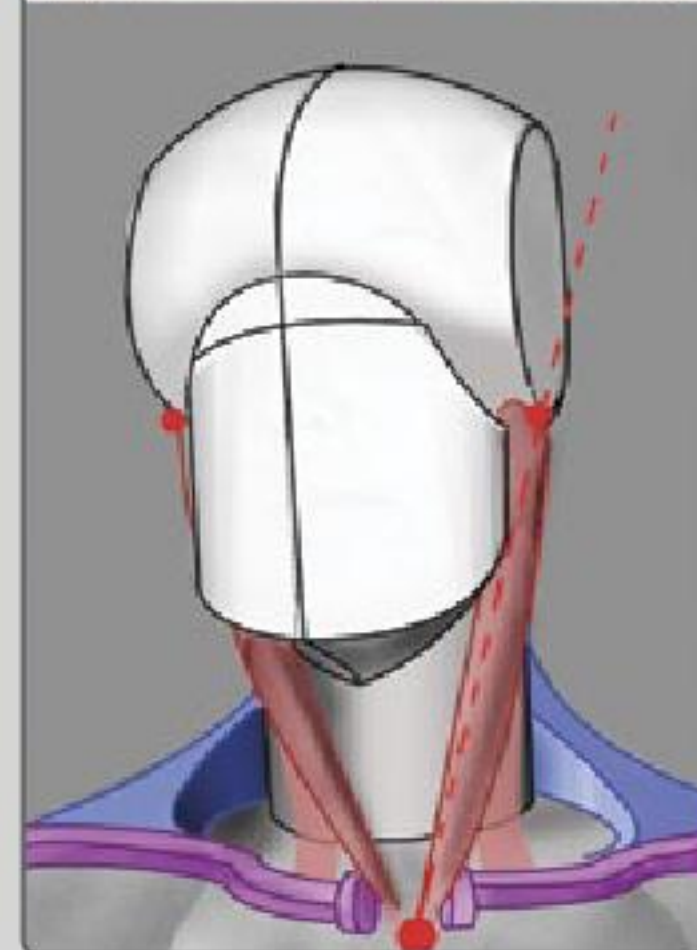
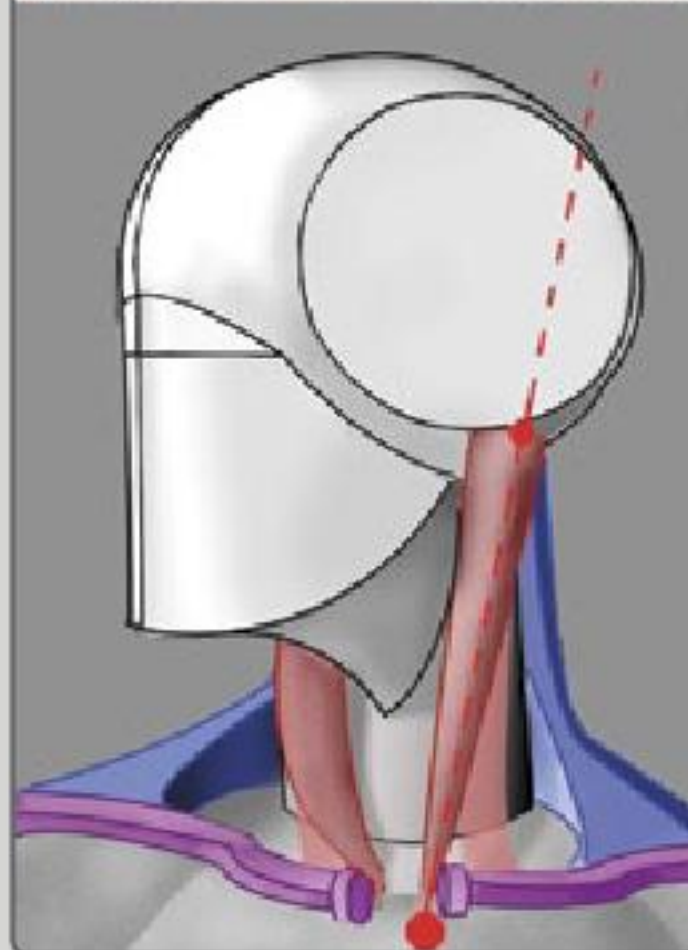
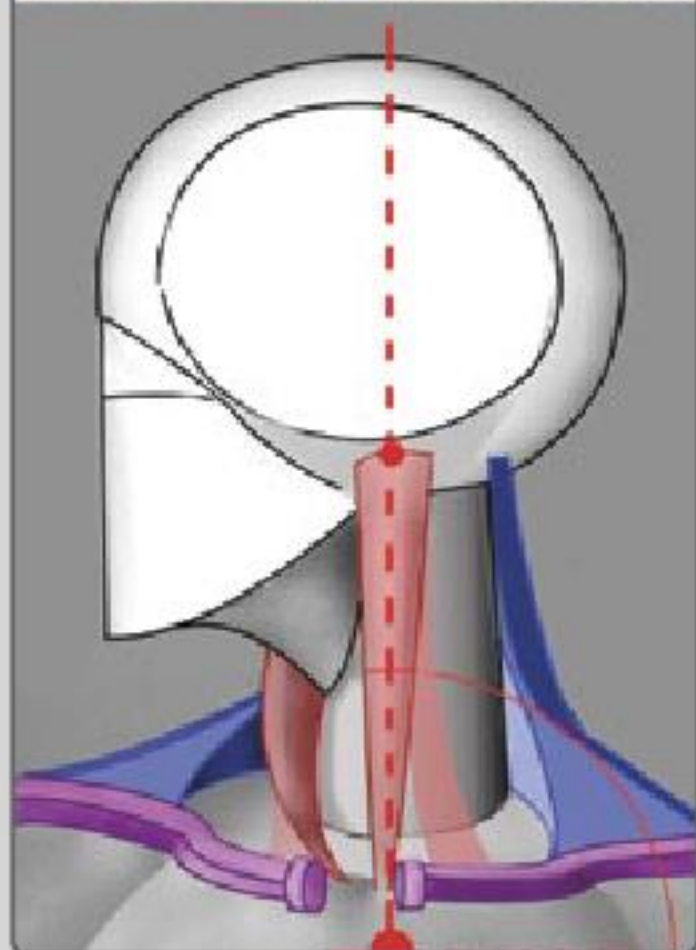
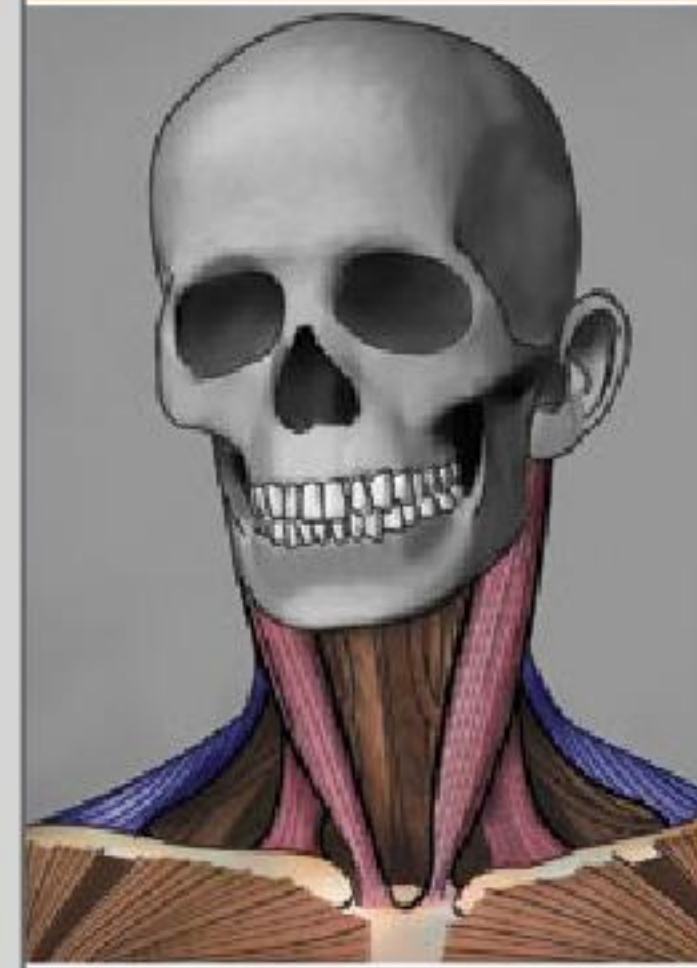
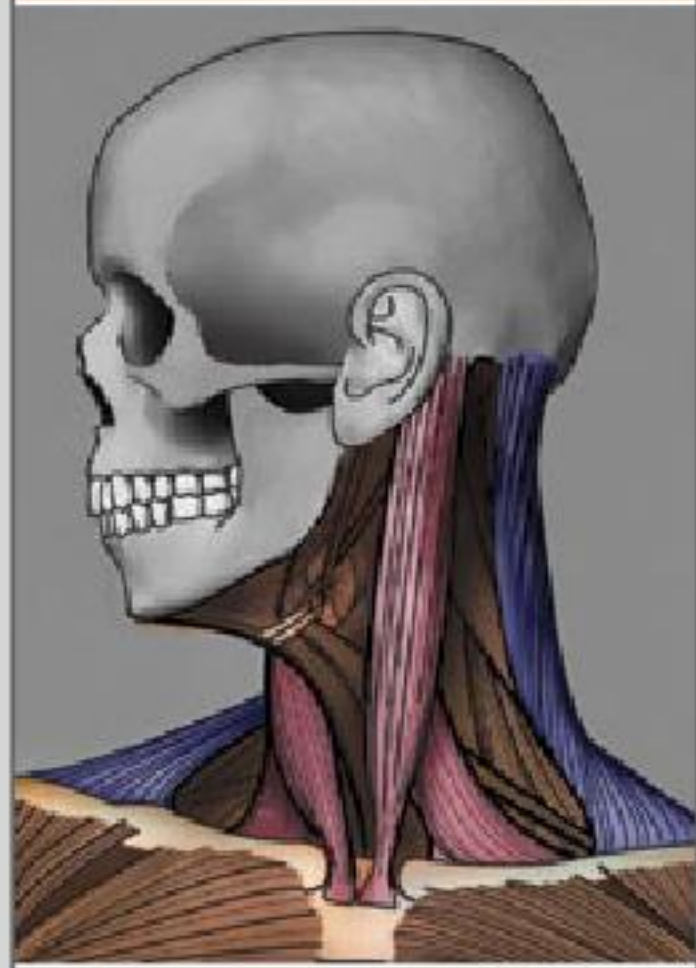
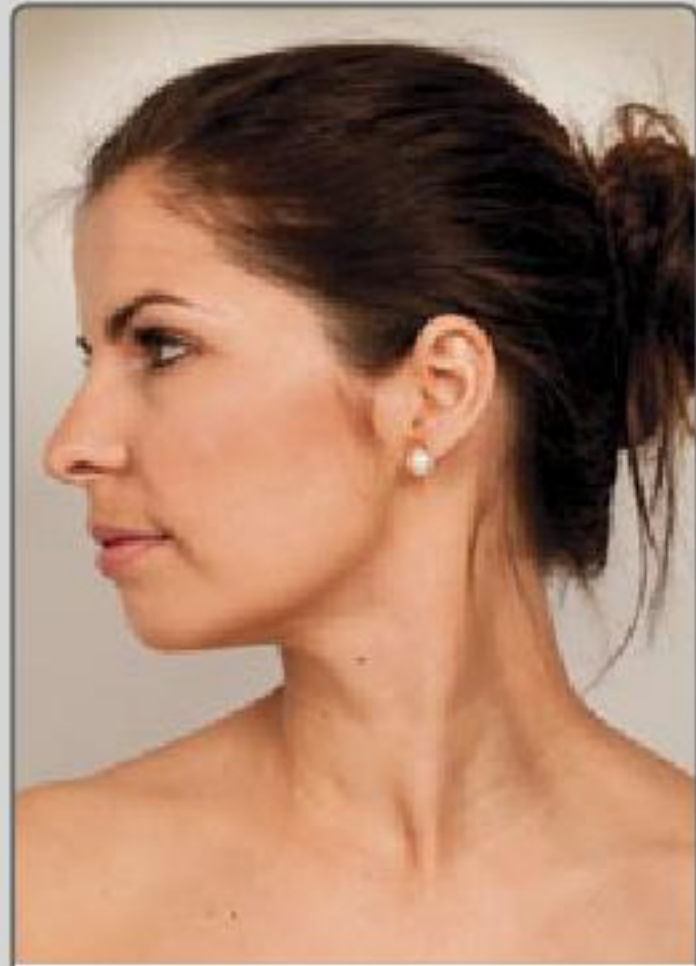


## TRAPEZIUS MUSCLE, STERNOCLEIDOMASTOID MUSCLE



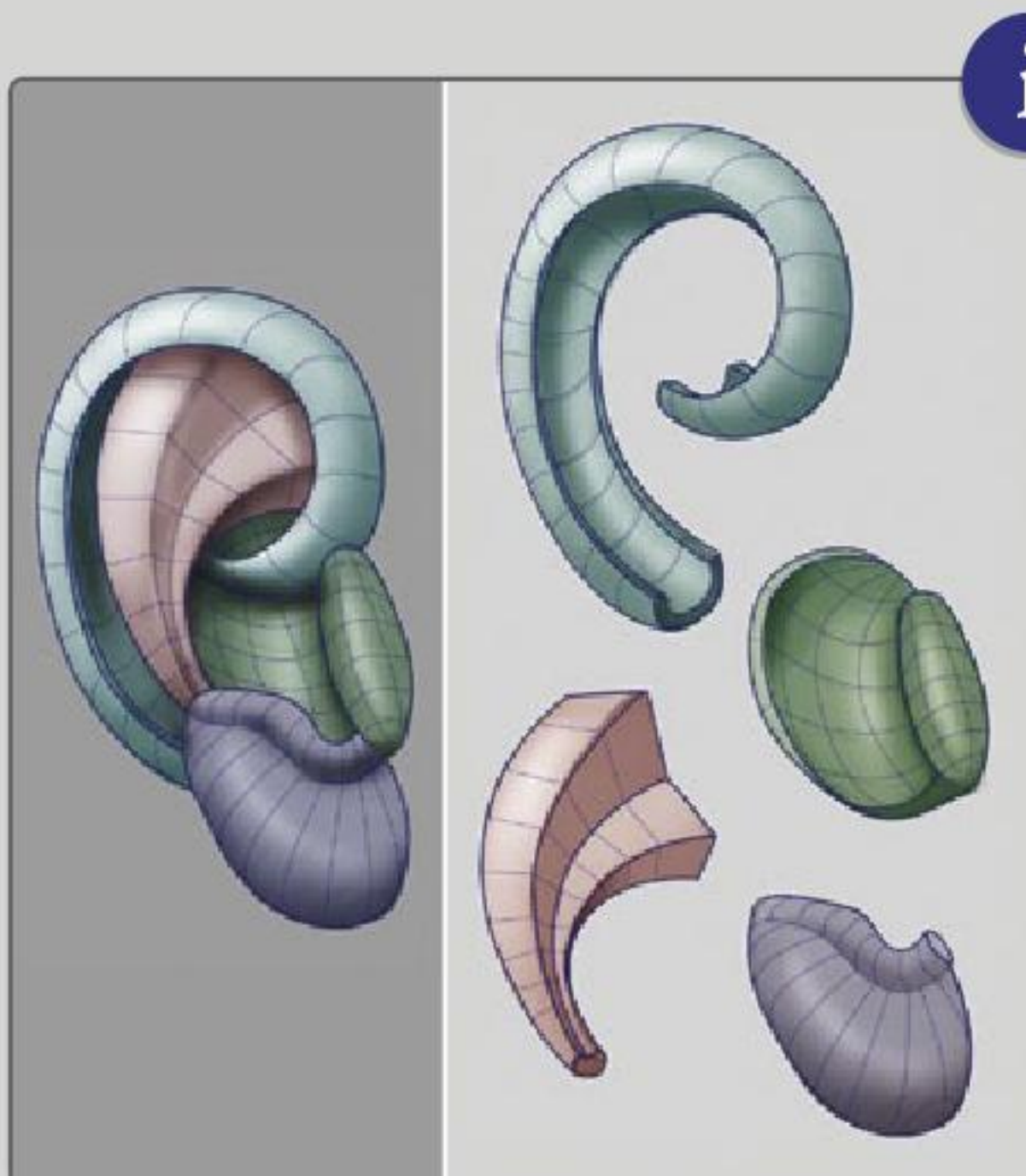
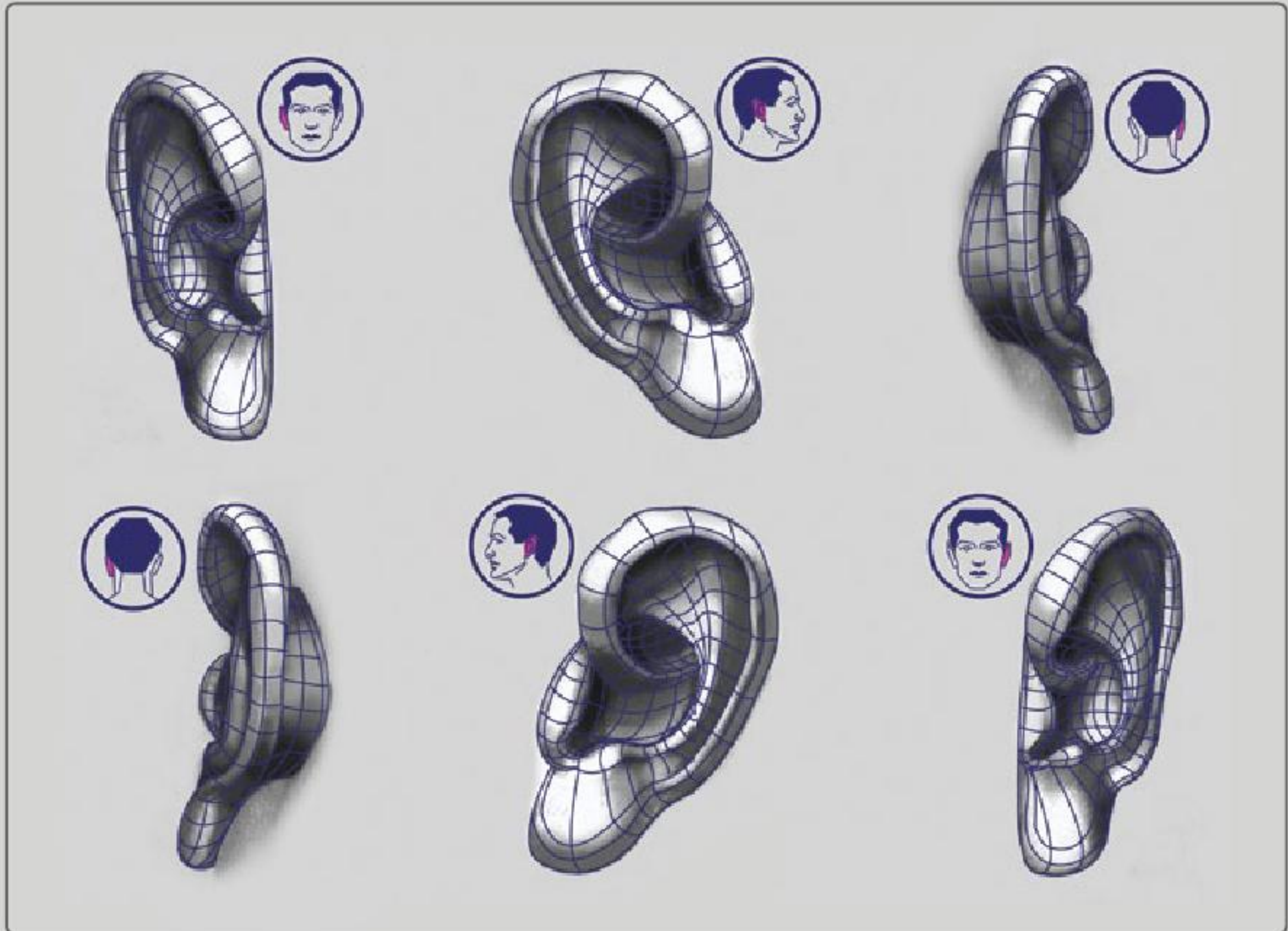


## MAJOR NECK MUSCLES (**TRAPEZIUS** AND **STERNOCLEIDOMASTOID**)

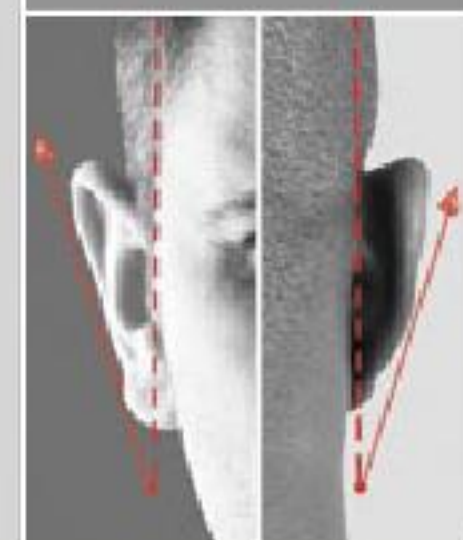
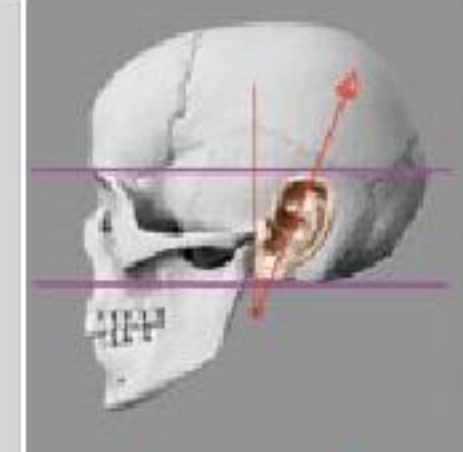




# EAR

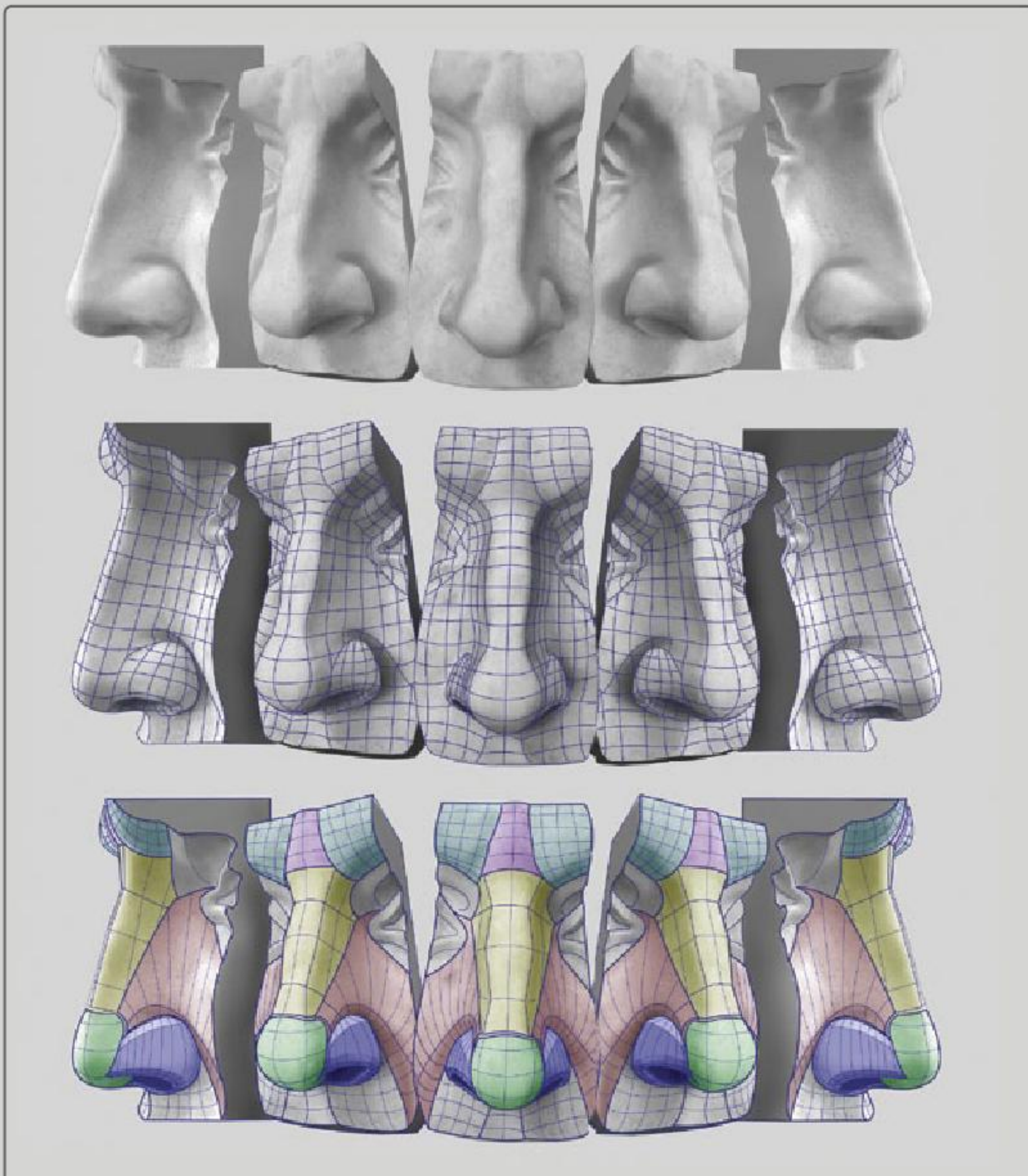
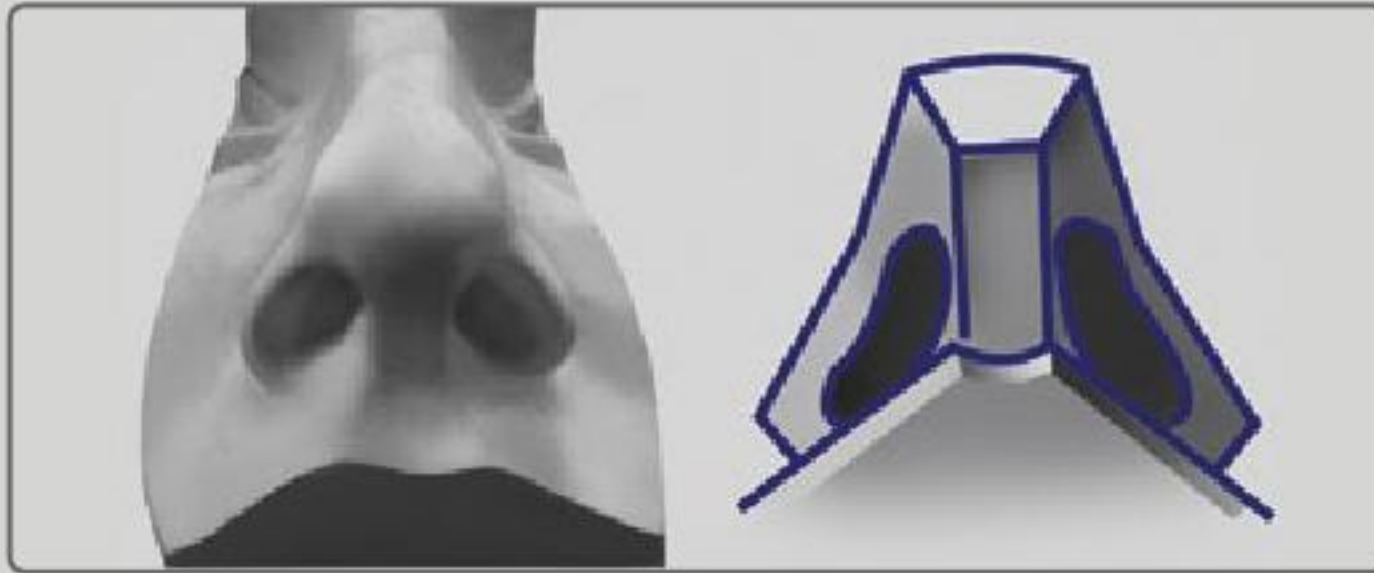


## LOCATION & ORIENTATION





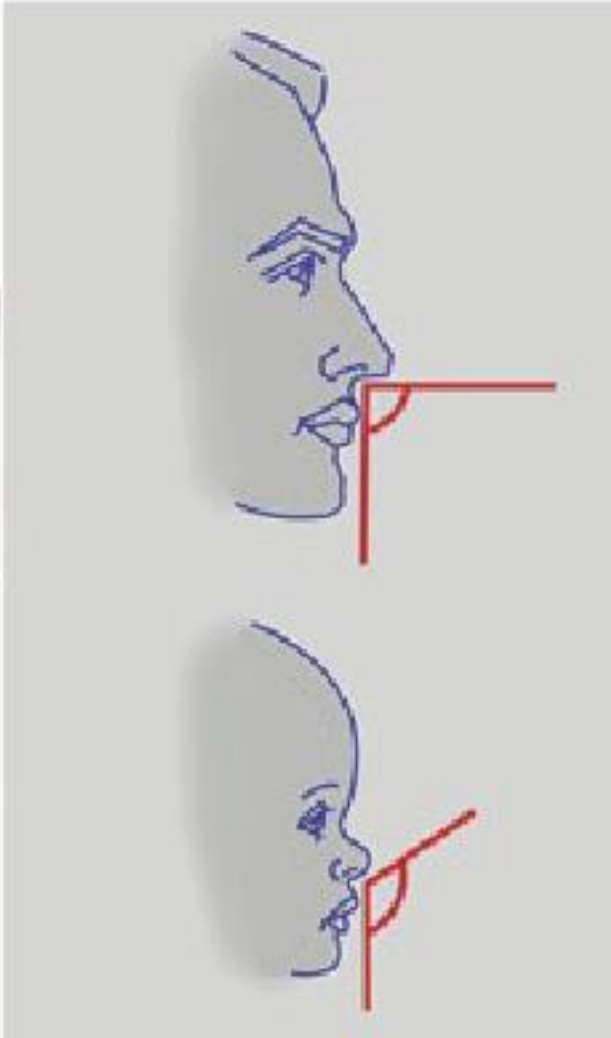
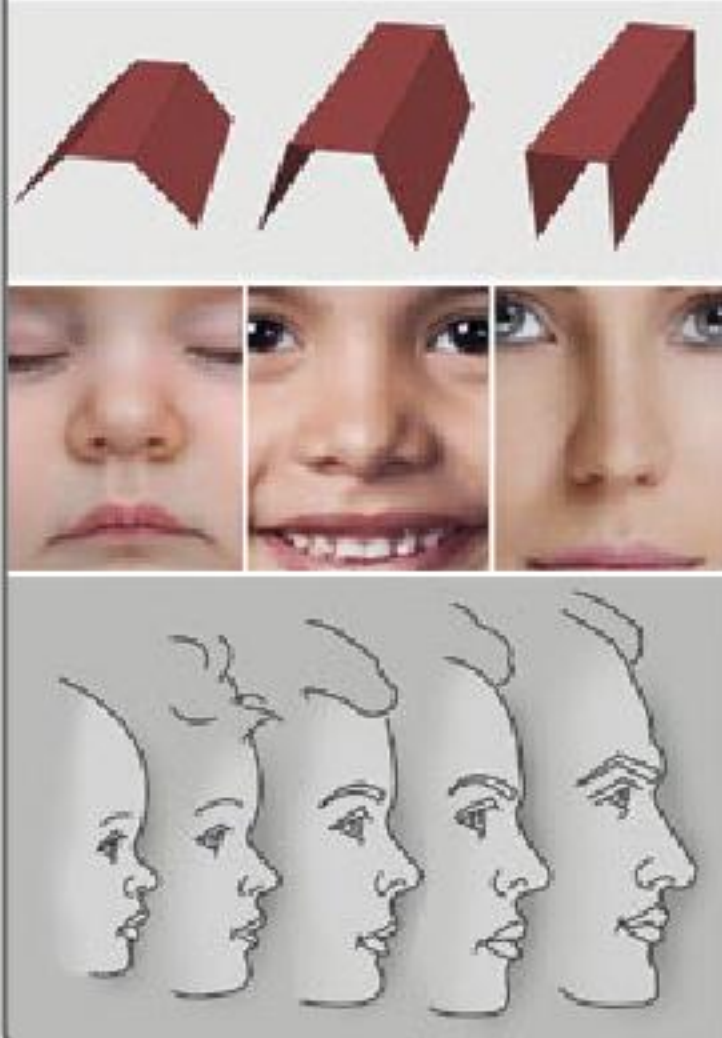
## CLASSICAL NOSE



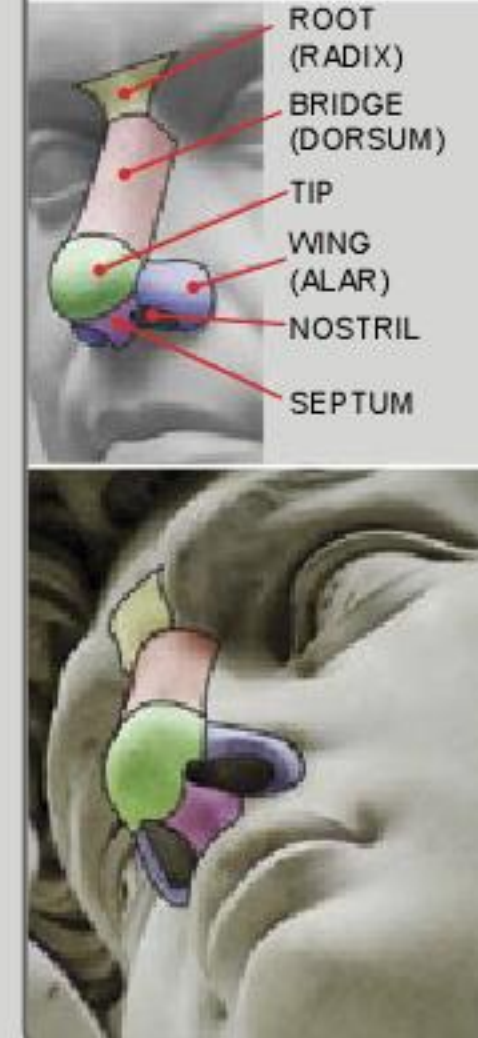


## ALL ABOUT NOSES

### NOSES CHANGE WITH AGE

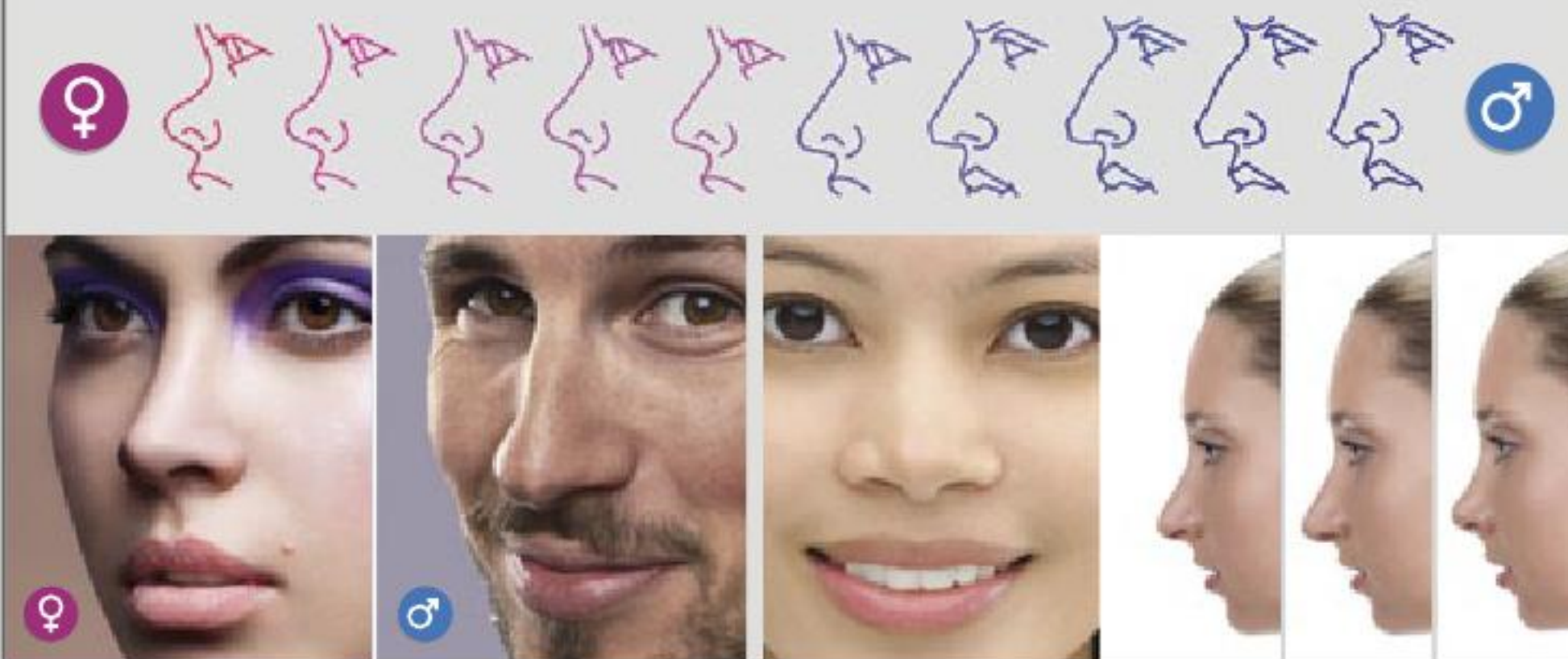


### PARTS OF A NOSE



### FEMALE VS. MALE NOSE

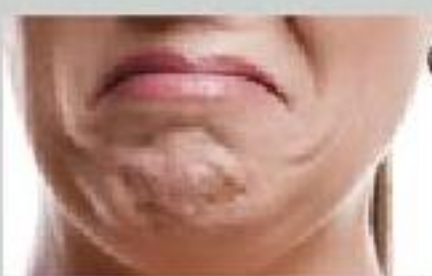
#### IDEALISTIC NOSE



TIPPING UP THE POINT OF THE NOSE WILL MAKE IT LOOK CHILD-LIKE. GIVING IT A CONCAVE OR THIN BRIDGE WILL MAKE IT LOOK MORE FEMININE!



## FUNCTIONS OF FACIAL MUSCLES

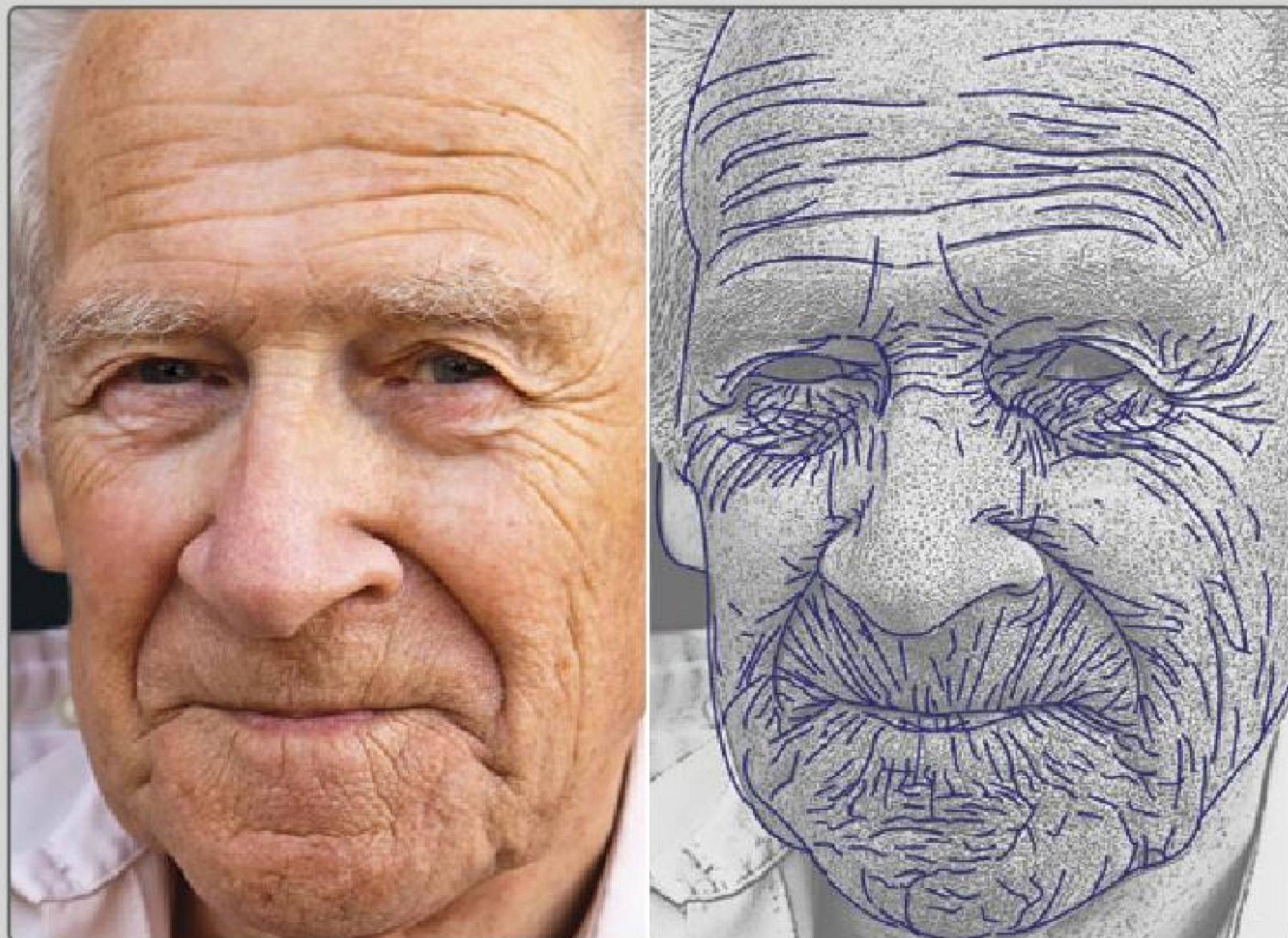




## DYNAMIC WRINKLES

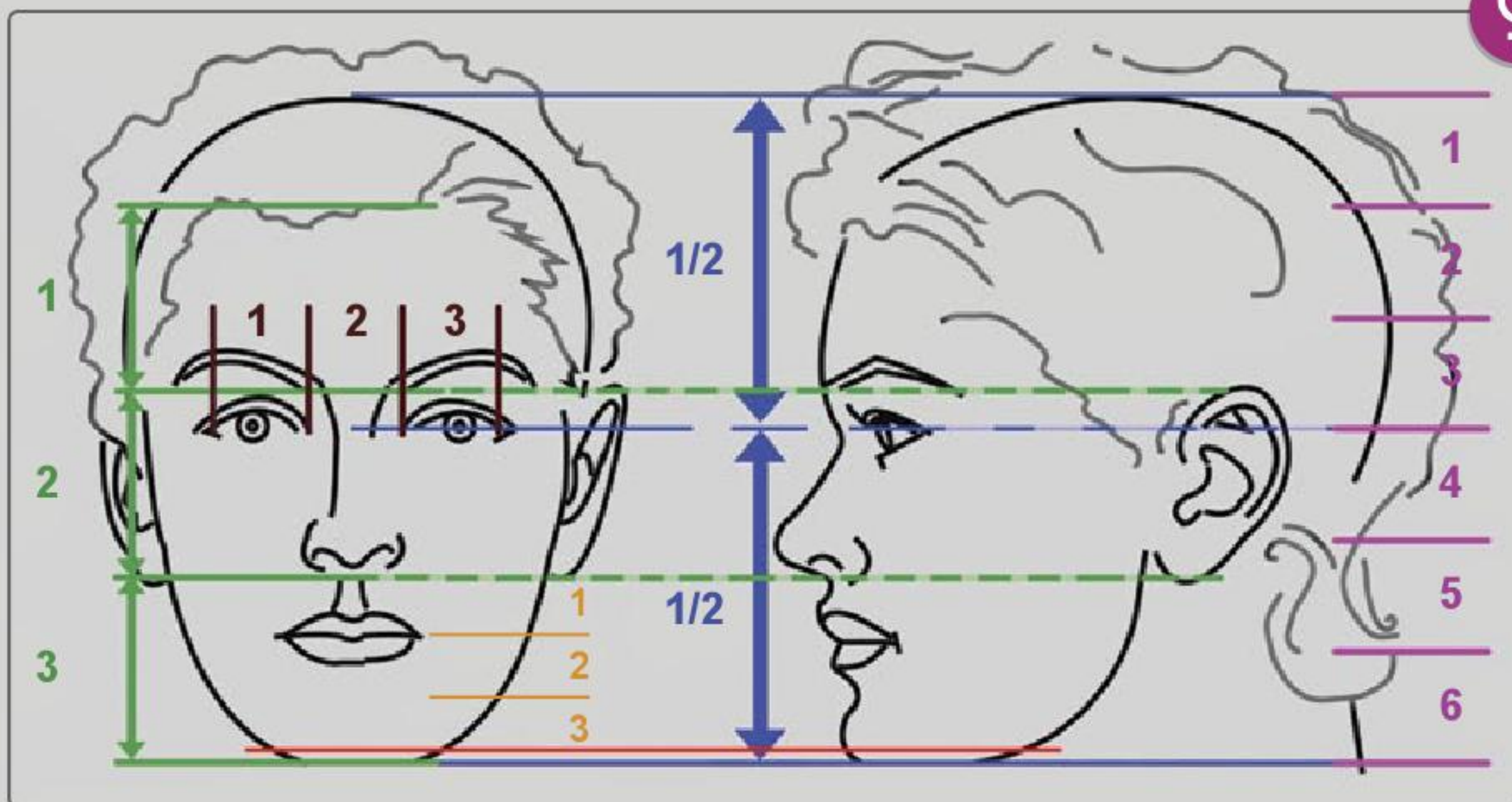
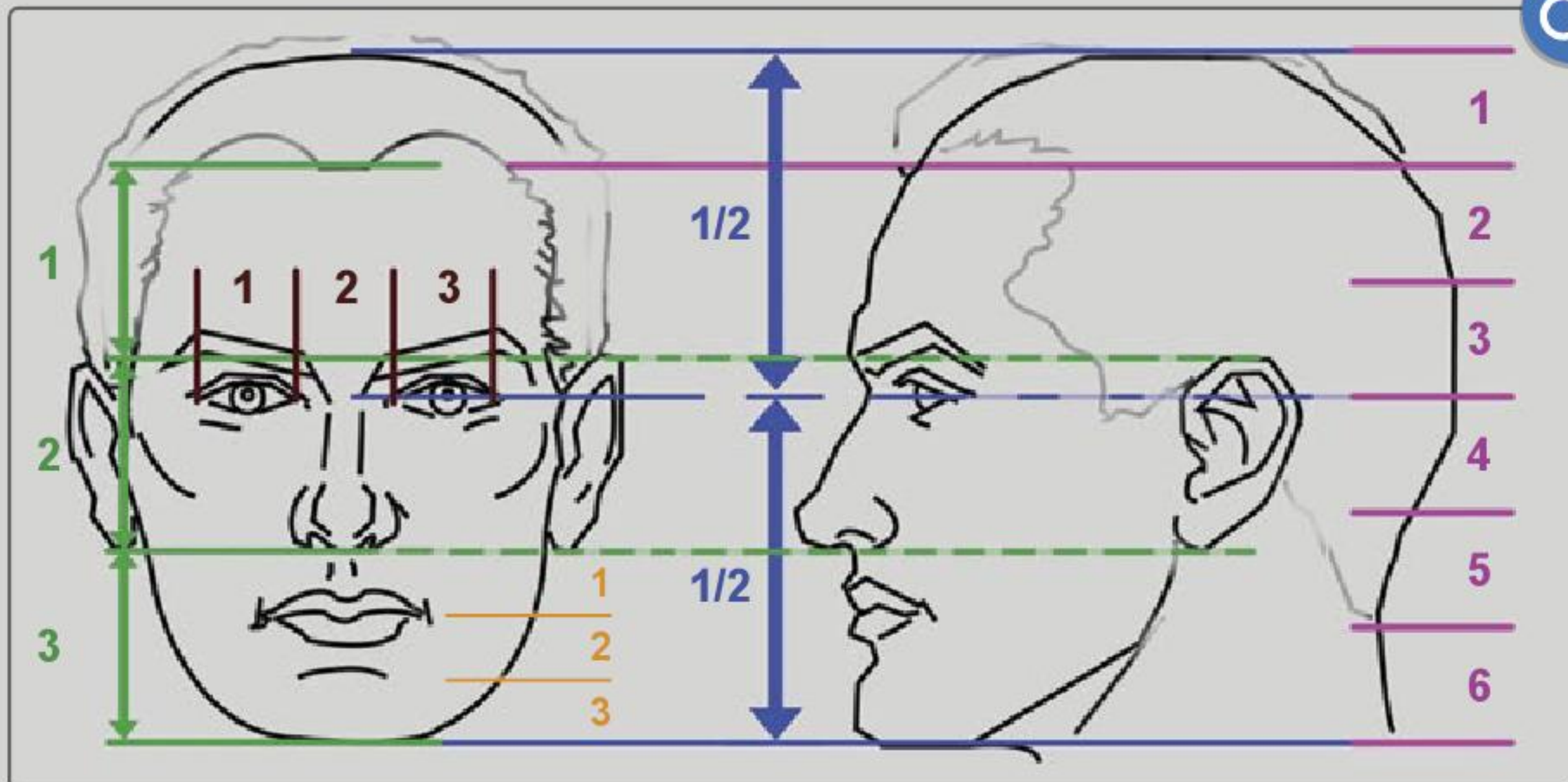


## AGING WRINKLES





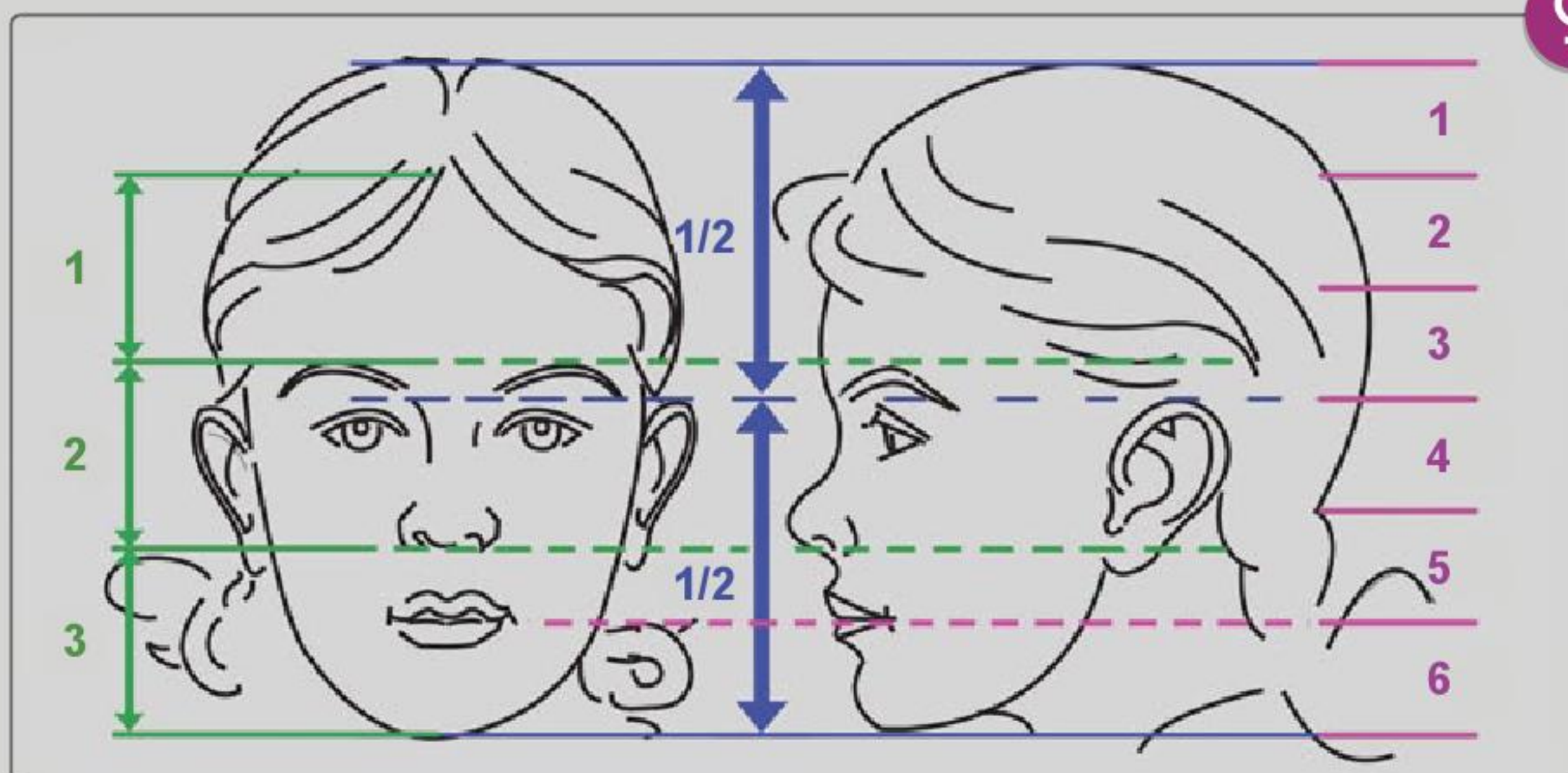
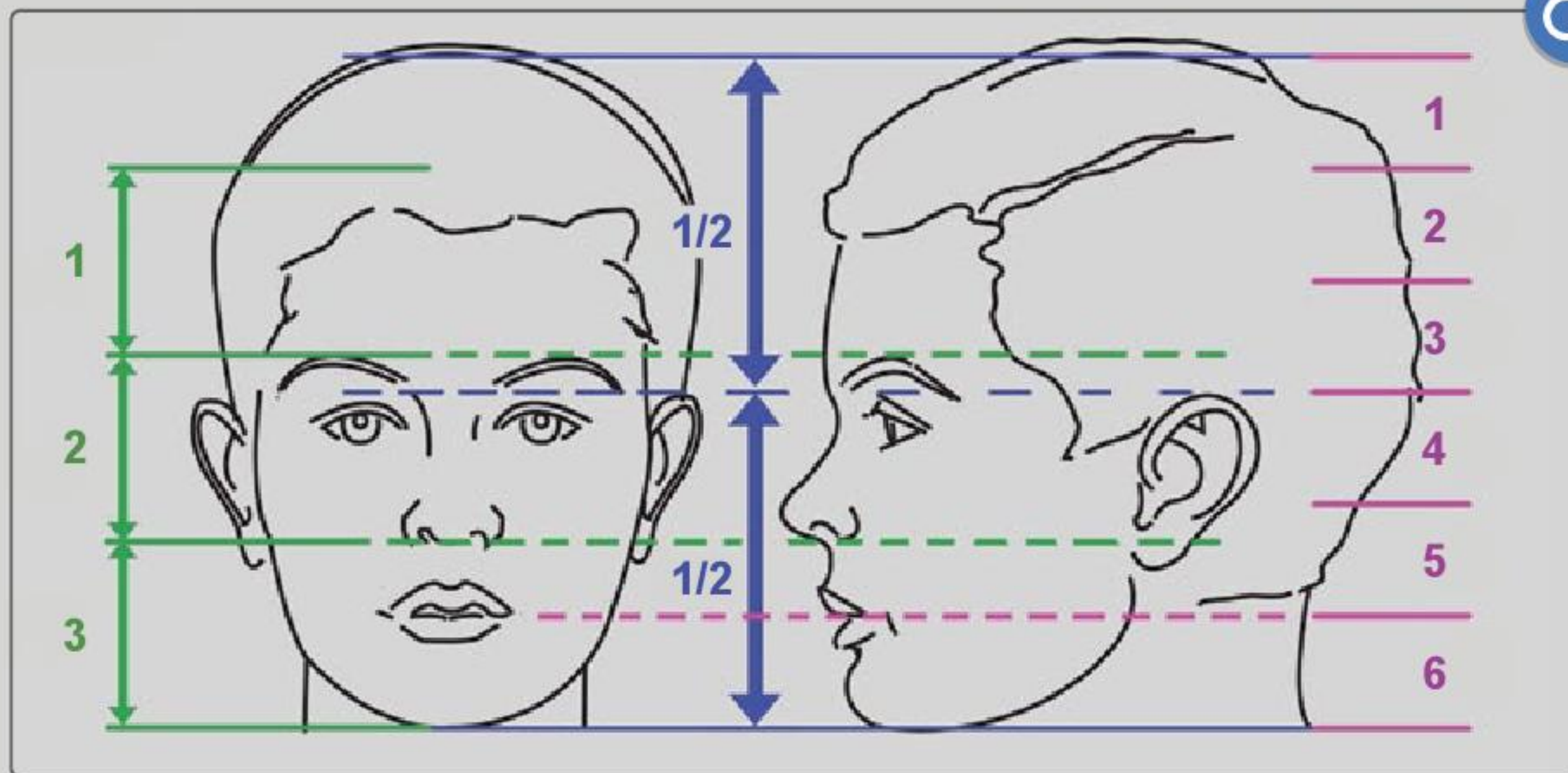
## IDEALIZED PROPORTIONS OF ADULT HEADS



FEMALES HAVE A SLIGHTLY THINNER CHIN AND JAW.

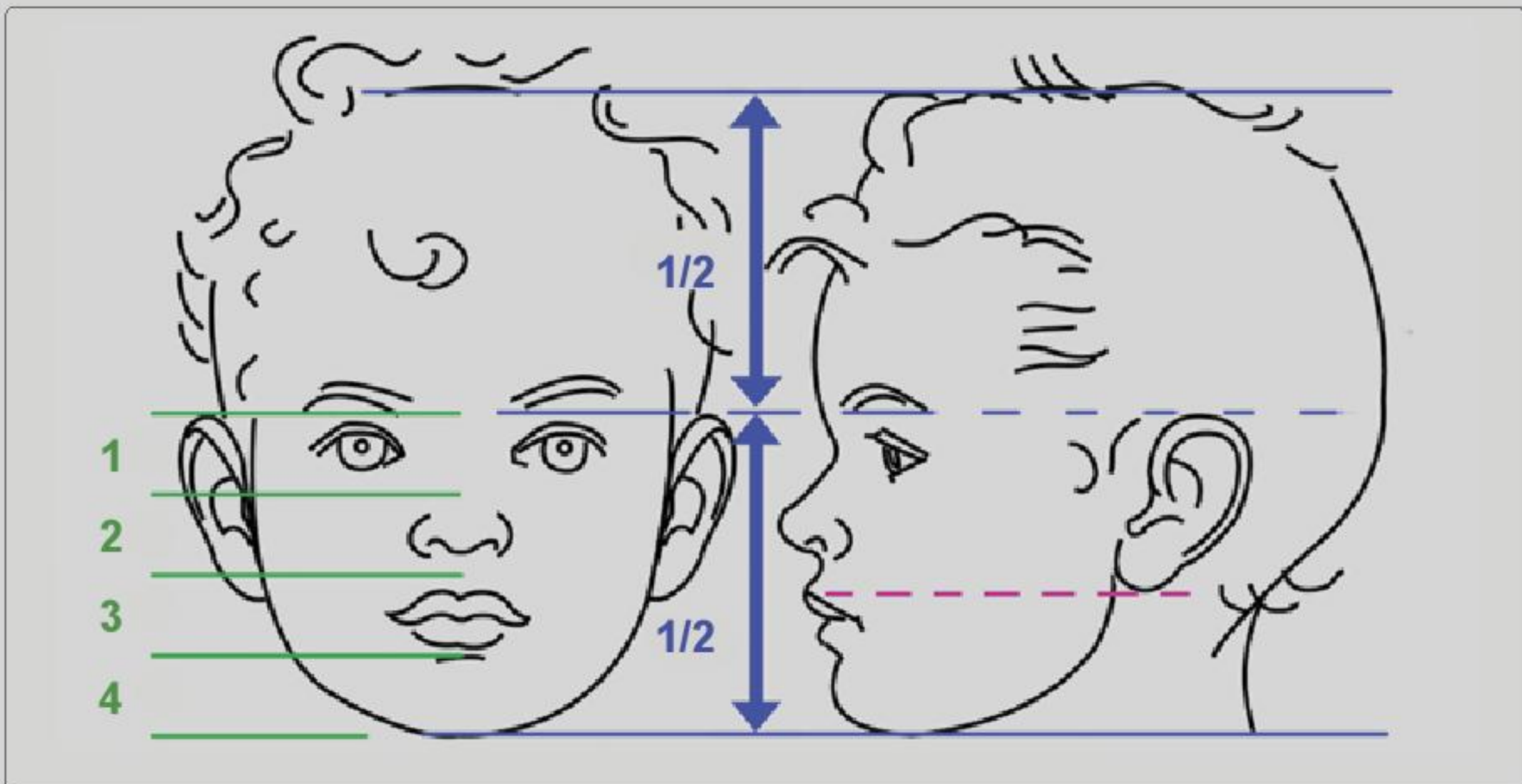
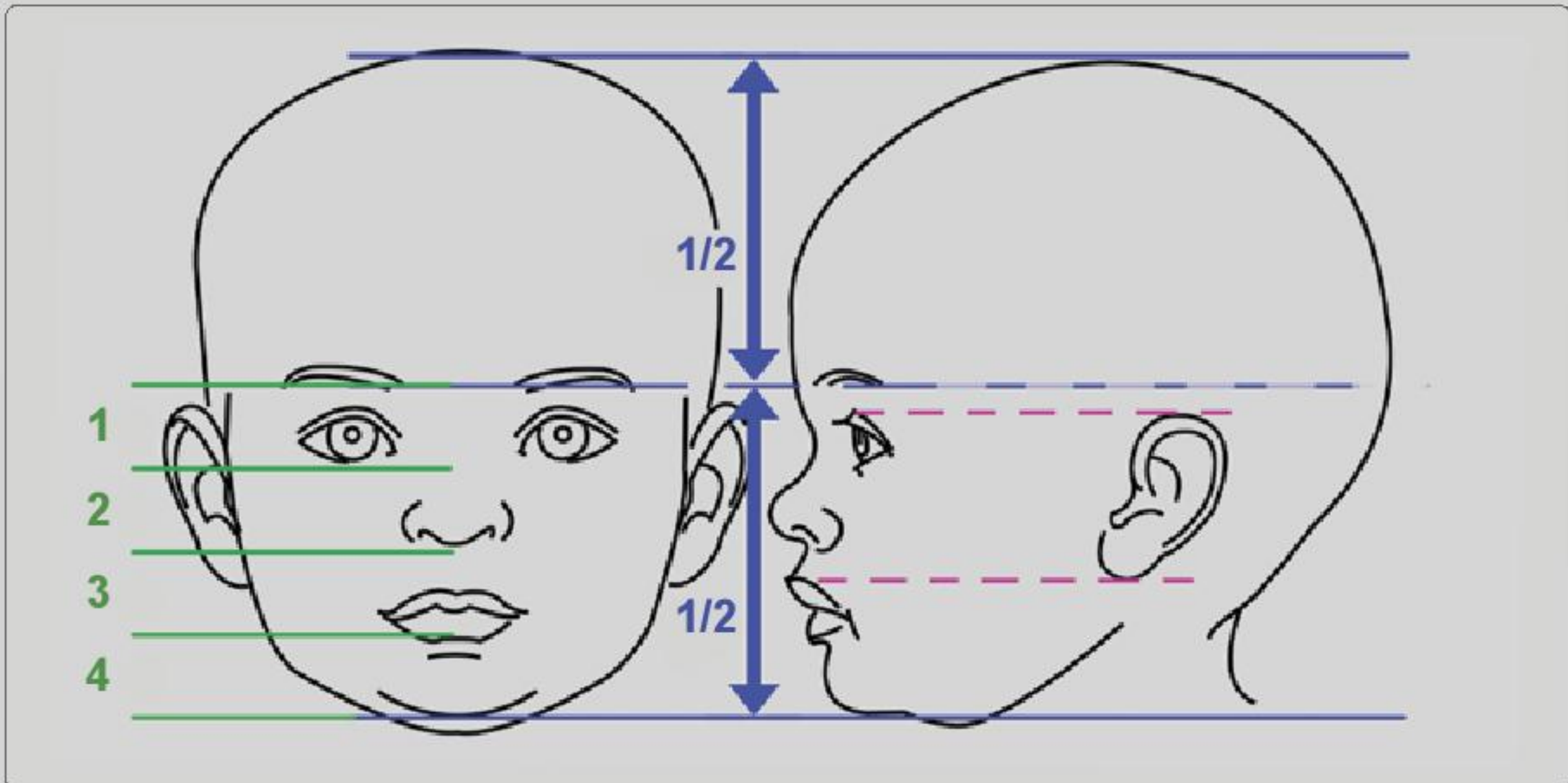


## PROPORTIONS OF CHILDREN'S HEADS



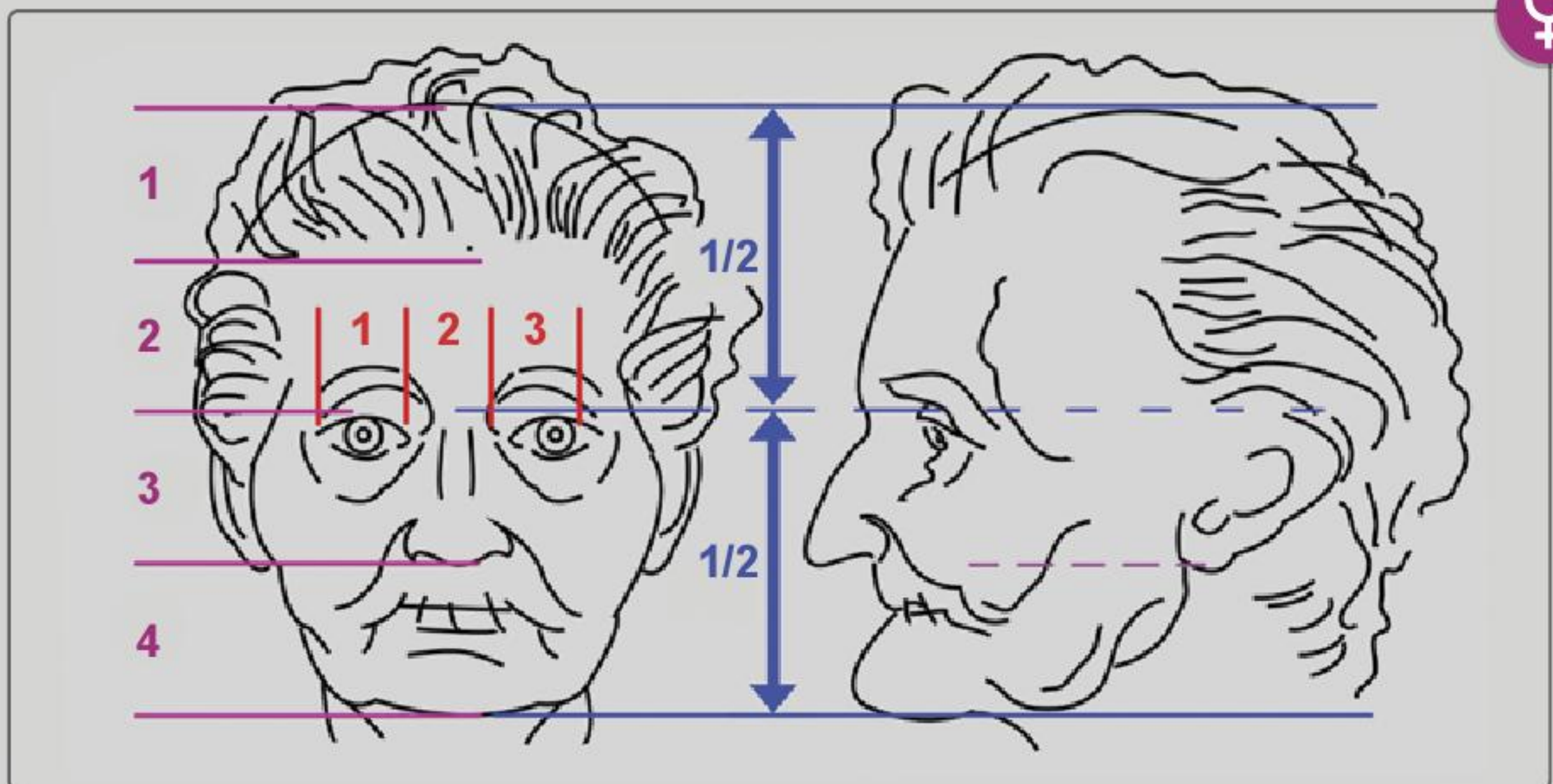
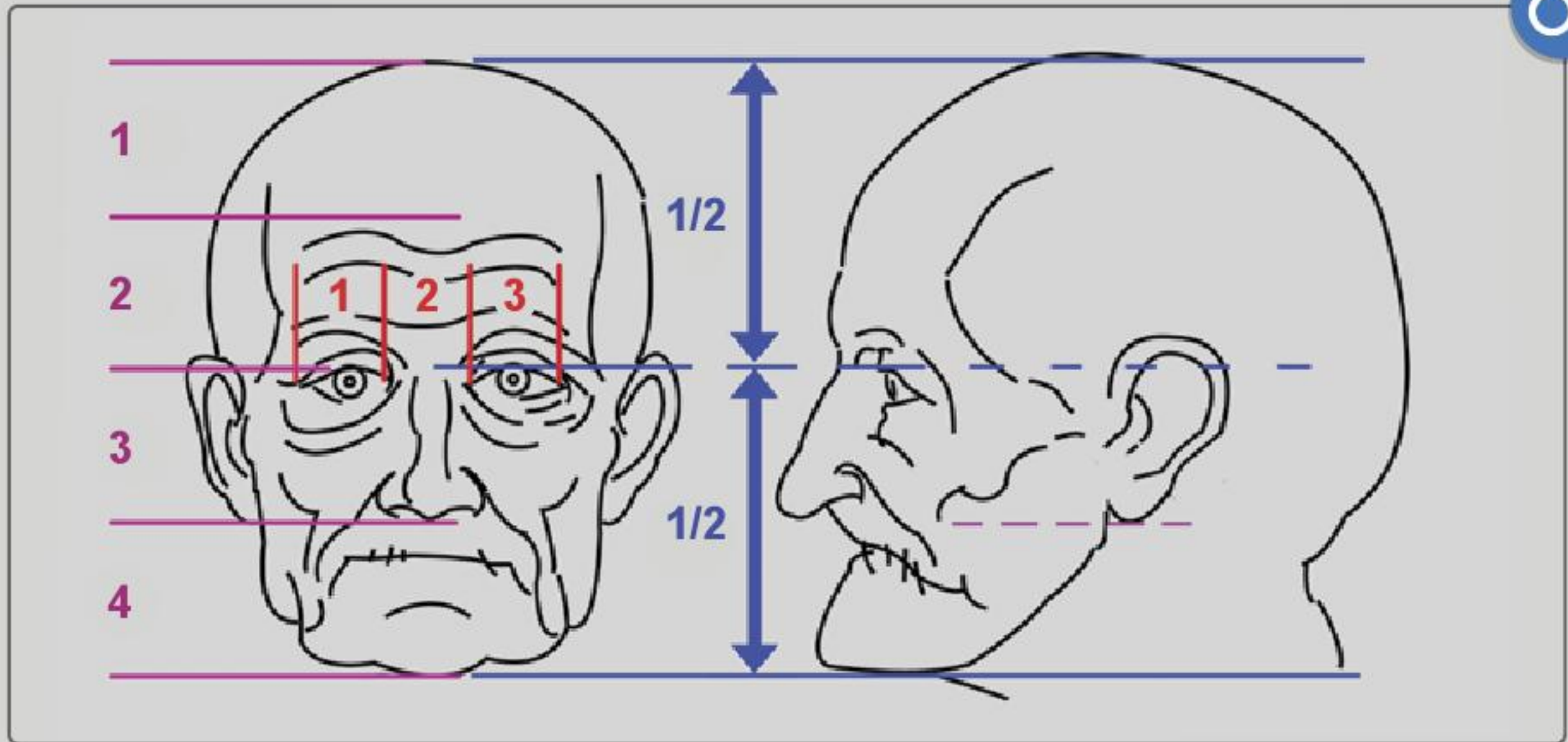


## PROPORTIONS OF BABY AND TODDLER HEADS



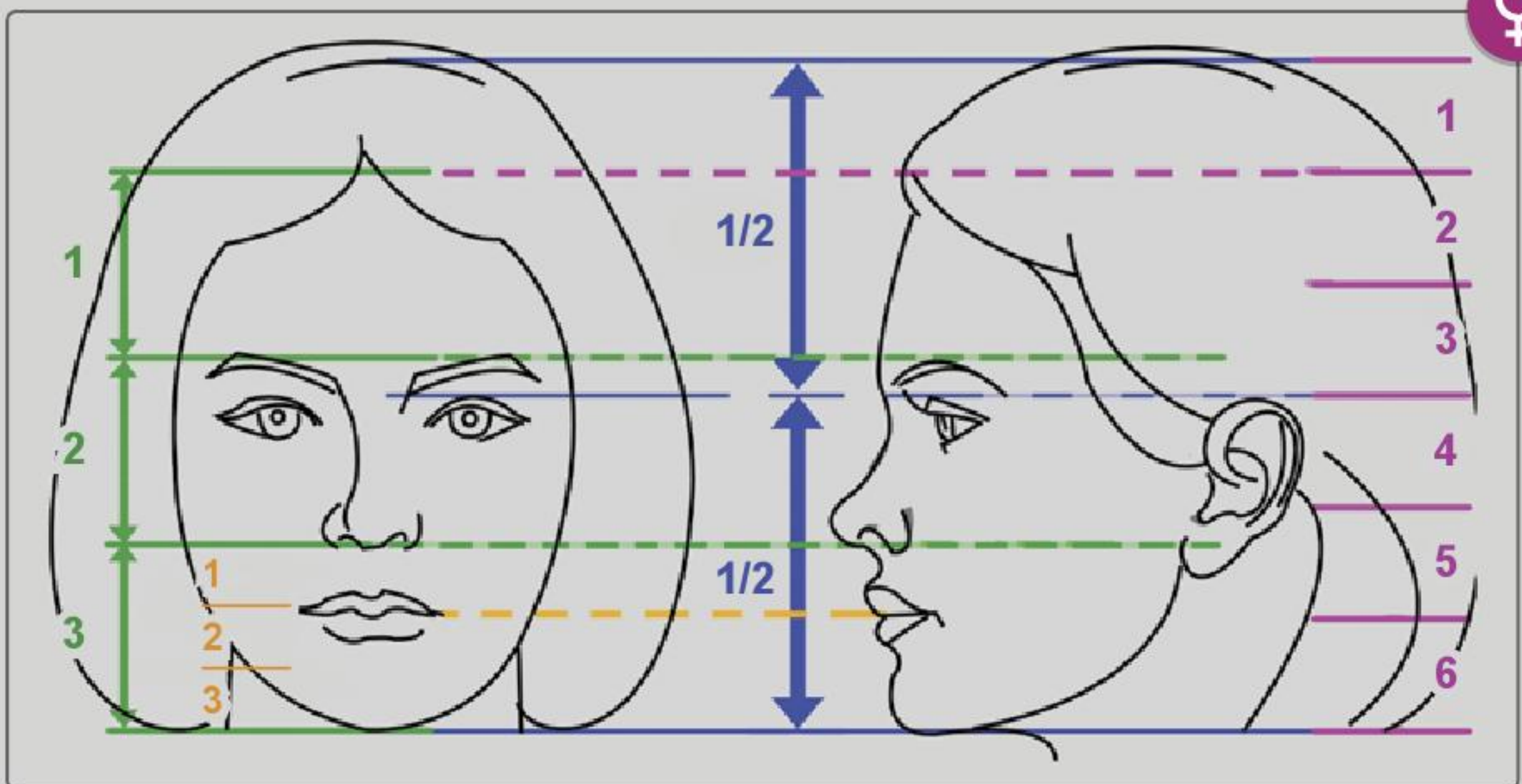
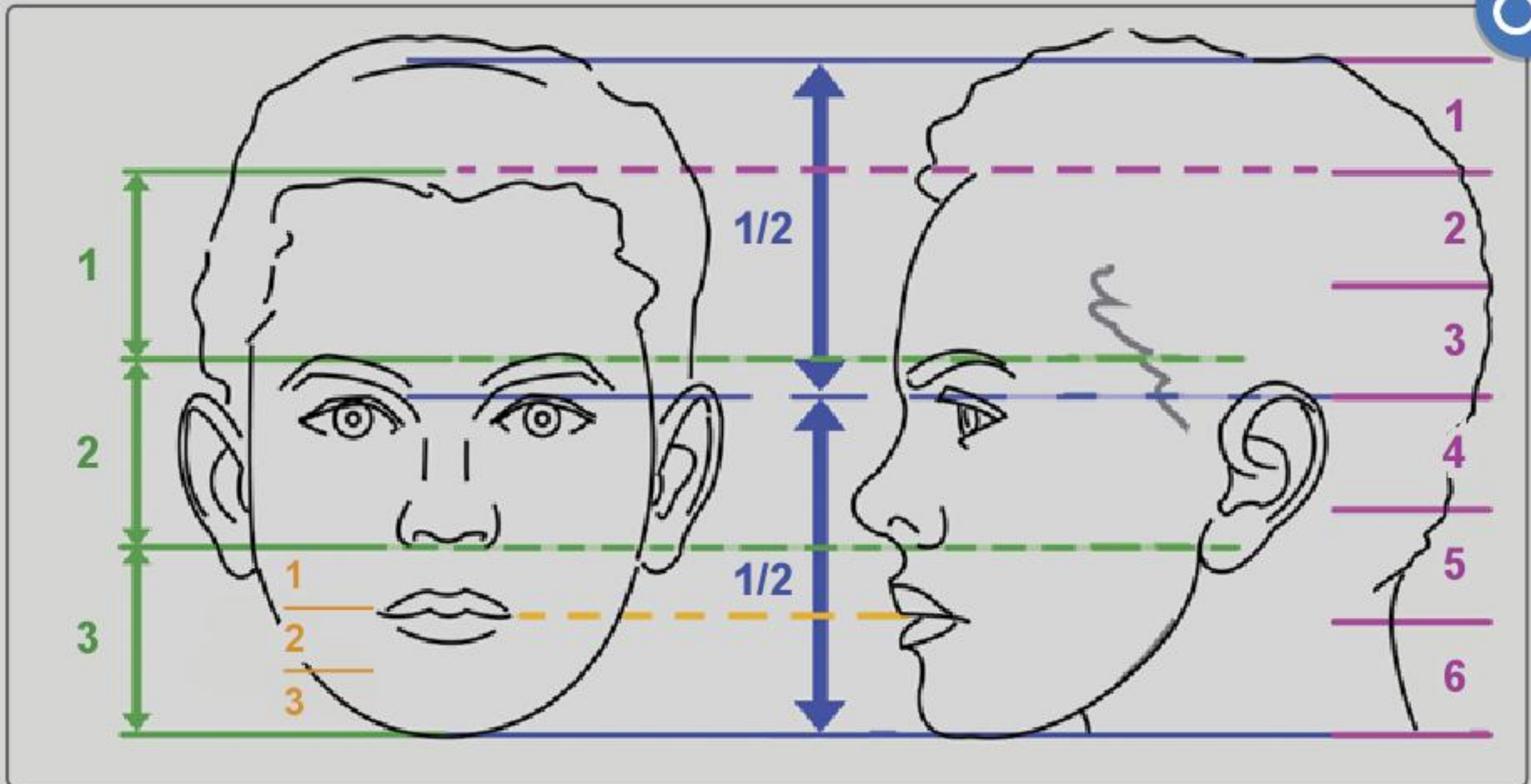


## PROPORTIONS OF ELDERLY HEADS





## PROPORTIONS OF TEEN HEADS





## GENDER DIFFERENCES BETWEEN IDEALIZED ADULT HEADS



- DISTINCT PROTRUDING **BROW RIDGES**
- **NOSE ROOT** IS USUALLY EXPRESSED CLEARLY AND CAN BE QUITE DEEP
- **PLANE OF FOREHEAD** HAS A SMALL SLOPE TOWARDS THE REAR, CONTOUR OF FOREHEAD IS NOT STRAIGHT BUT SOMEWHAT WAVY
- **CHEEKBONES** EXPRESSED CLEARLY
- BUSHY **EYEBROWS** STAND OUT, AS A RULE ARE LESS ARCHED SHAPE AND SIT LOWER OVER EYES
- **UPPER EYELID** IS NOT PARTICULARLY DISTINGUISHED AND IS LOCATED CLOSE TO EDGE OF THE INFRAORBITAL FORAMEN
- LONGER **NOSE** COMPARED TO A FEMALE
- UNDERLYING **THE NOSE** IS A CLEARLY VISIBLE BONE-SKELETAL STRUCTURE, IT IS USUALLY LARGE. FORM IS ALMOST STRAIGHT OR SLIGHTLY CONVEX.
- **NOSE** IS THICK AND BROAD
- BASE OF **NOSE** LIES ON A HORIZONTAL PLANE
- TIP OF **NOSE** IS LARGE AND ROUNDED
- FOLD CONTOUR OF **UPPER LIP** IS SLIGHTLY CONVEX
- CAUCASIAN MALE **LIPS** ARE NOT AS FULL AND PUFFY AS A FEMALE'S
- PROTRUDING **CHEEKBONES**
- **CHIN** IS MASSIVE, CLEARLY DEFINED, OFTEN DIMPLED
- **LOWER JAW'S** WIDEST CORNERS ARE MARKED CLEARLY AND SOMEWHAT SHIFTED Laterally (DUE TO DEVELOPED CHEWING MUSCLES)



- CLEARLY EXPRESSED **EYEBROWS**
- SMALLER **NOSE ANGLE**
- MORE VERTICAL, PROMINENT AND ROUNDER **PLANE OF FOREHEAD**
- PROTRUDING **CHEEKBONES**
- THIN **EYEBROWS** WITH AN ARCHED FORM, USUALLY MUCH HIGHER THAN THE EYES OF MALES
- LARGER **UPPER EYELID**
- DEEPENING OF **ROOT OF THE NOSE** IS ALMOST UNNOTICEABLE
- STRUCTURE OF **NOSE** IS THIN AND USUALLY STRAIGHT OR SLIGHTLY CONCAVE
- **NOSE**, THIN WELL-DEFINED
- **BASE OF NOSE** ON PLANE, TILTED SOMEWHAT UPWARD
- **TIP OF THE NOSE** CLEARLY EXPRESSED (DUE TO CARTILAGE STRUCTURE)
- UPPER LIP OFTEN HAS A SLIGHT INDENTATION CENTERED UNDER THE NOSE CALLED THE PHILTRUM
- **LIPS** ARE SMALL, OFTEN FULL AND POUTY
- **CHEEKS** ARE SMOOTH, AND SOMETIMES PUBESCENT, FLAT OR SLIGHTLY CONVEX
- A SMALL **CHIN** WITH A ROUND SHAPE
- **LOWER JAW** IS MARKEDLY DEFINED, WITH A ROUNDED ANGLE
- IN RELATION TO THE SIZE OF HEAD AND SHOULDERS, WOMEN HAVE A LONG, SLENDER **NECK**



## EMOTION – EXCITEMENT





## EMOTION – HAPPINESS





## EMOTION – ANGER





## EMOTION – SURPRISE





## EMOTION – DISGUST





## EMOTION – FEAR





## EMOTION – INTEREST





## EMOTION – WORRY





## ETHNICITIES





## BABY EMOTIONS





## SENIOR EMOTIONS





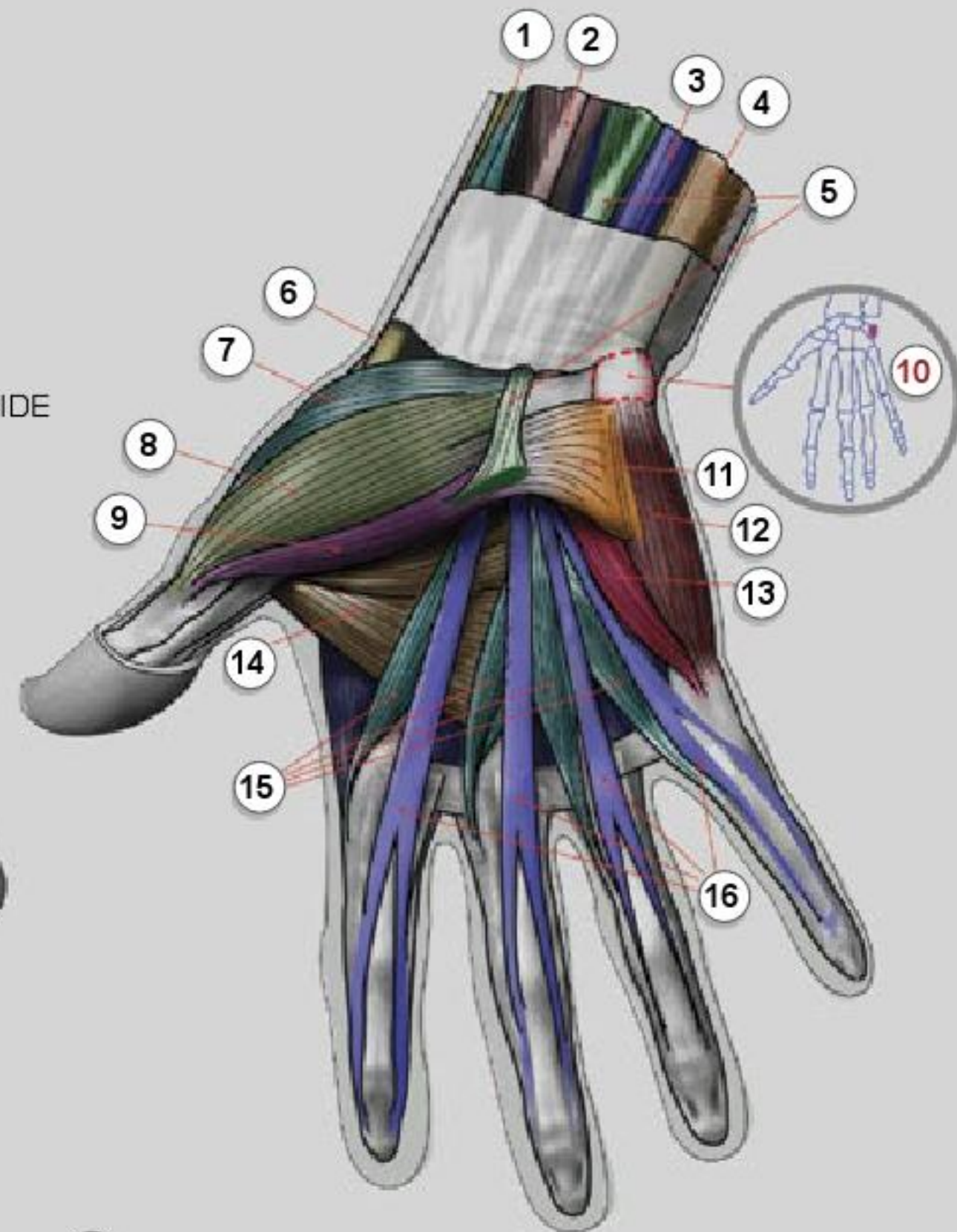




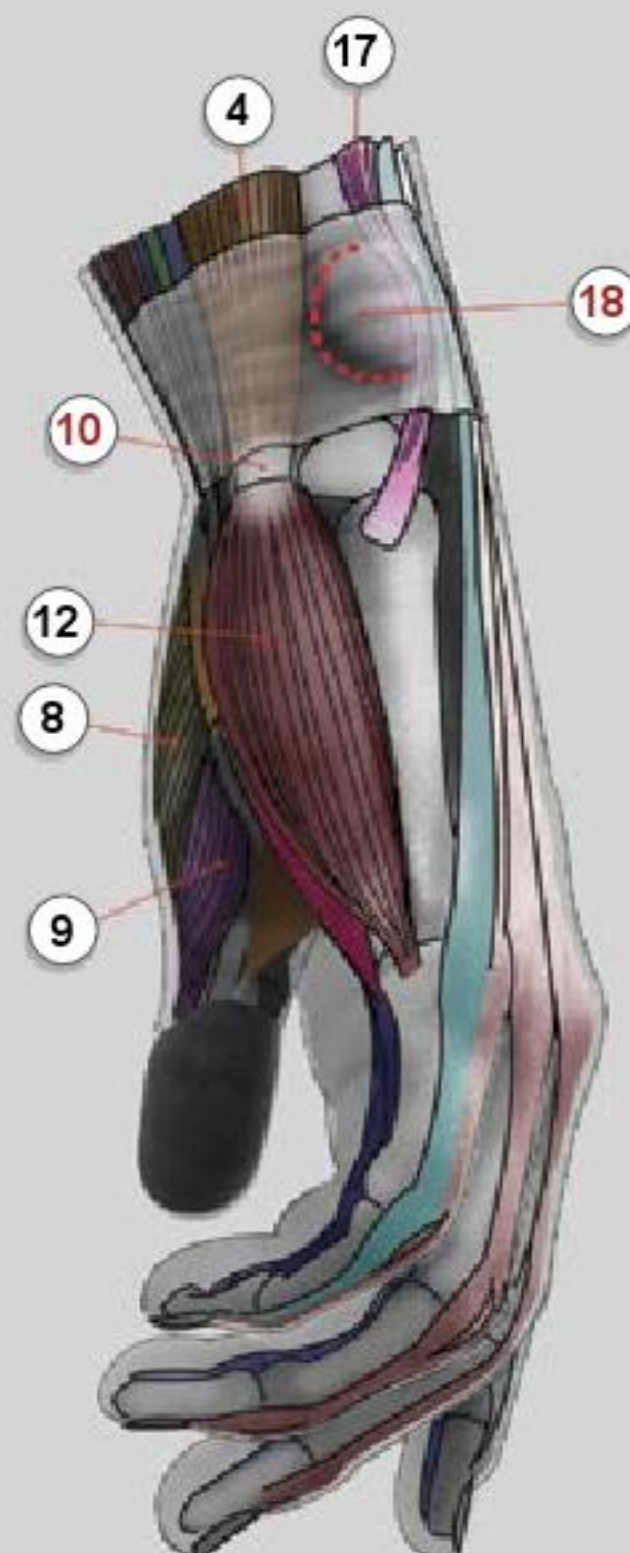
# HAND AND WRIST MUSCLES



PALM SIDE



LITTLE  
FINGER  
SIDE



- 1 BRACHIORADIALIS
- 2 FLEXOR CARPI RADIALIS
- 3 f.d.s.\*
- 4 FLEXOR CARPI ULNARIS
- 5 PALMARIS LONGUS
- 6 ABDUCTOR POLLICIS LONGUS
- 7 OPPONENS POLLICIS
- 8 ABDUCTOR POLLICIS BREVIS
- 9 FLEXOR POLLICIS BREVIS
- 10 **PISIFORM BONE**
- 11 PALMARIS BREVIS
- 12 ABDUCTOR DIGITI MINIMI
- 13 FLEXOR DIGITI MINIMI BREVIS
- 14 ADDUCTOR POLLICIS
- 15 LUMBRICALS
- 16 TENDONS OF f.d.s.\*
- 17 EXTENSOR CARPI ULNARIS
- 18 **THE HEAD OF THE ULNA**

flexor digitorum superficialis \*

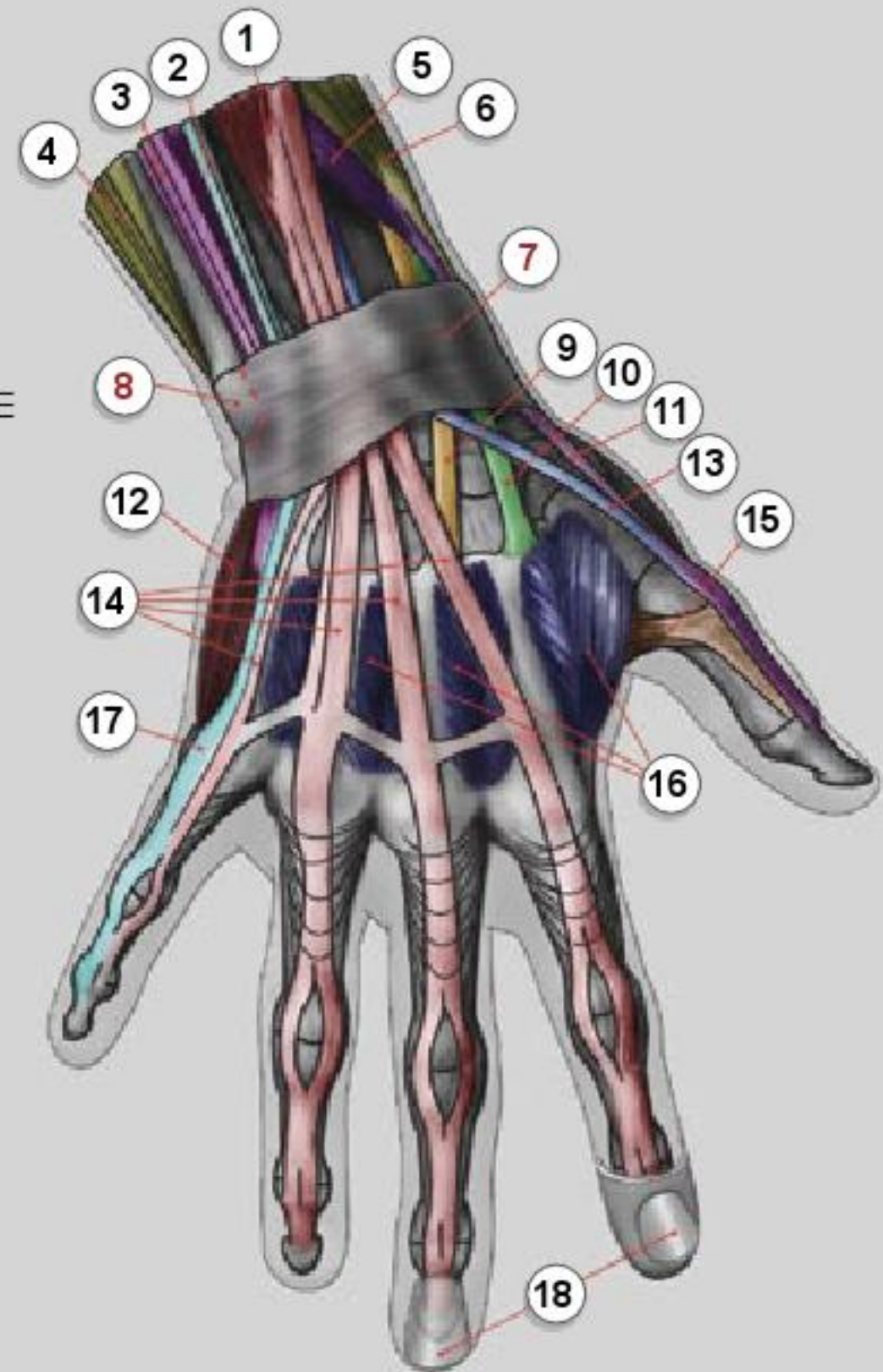


# HAND AND WRIST MUSCLES

i



DORSAL SIDE



THUMB SIDE

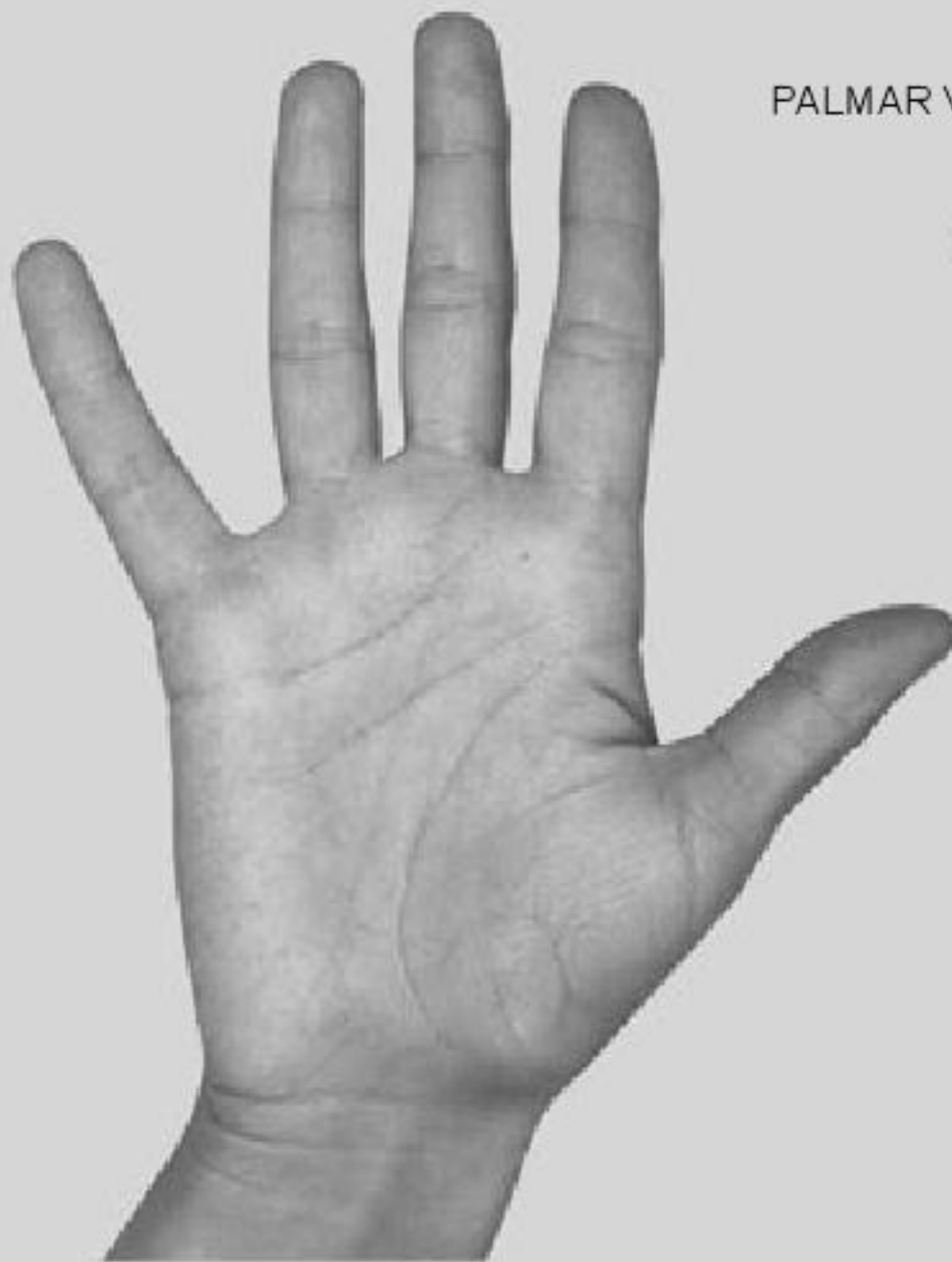


- 1 EXTENSOR DIGITORUM
- 2 EXTENSOR DIGITI MINIMI
- 3 EXTENSOR CARPI ULNARIS
- 4 FLEXOR CARPI ULNARIS
- 5 EXTENSOR POLLICIS BREVIS
- 6 ABDUCTOR POLLICIS LONGUS
- 7 EXTENSOR RETINACULUM
- 8 THE HEAD OF THE ULNA BONE
- 9 TENDON OF e.c.r.b.\*
- 10 TENDON OF e.c.r.l.\*\*
- 11 TENDON OF e.p.b.\*\*\*
- 12 ABDUCTOR DIGITI MINIMI
- 13 TENDON OF e.p.l.\*\*\*\*
- 14 TENDONS OF e.d.\*\*\*\*\*
- 15 ADDUCTOR POLLICIS
- 16 DORSAL INTEROSSEI MUSCLES
- 17 EXTENSOR OF e.d.m.\*\*\*\*\*
- 18 NAIL

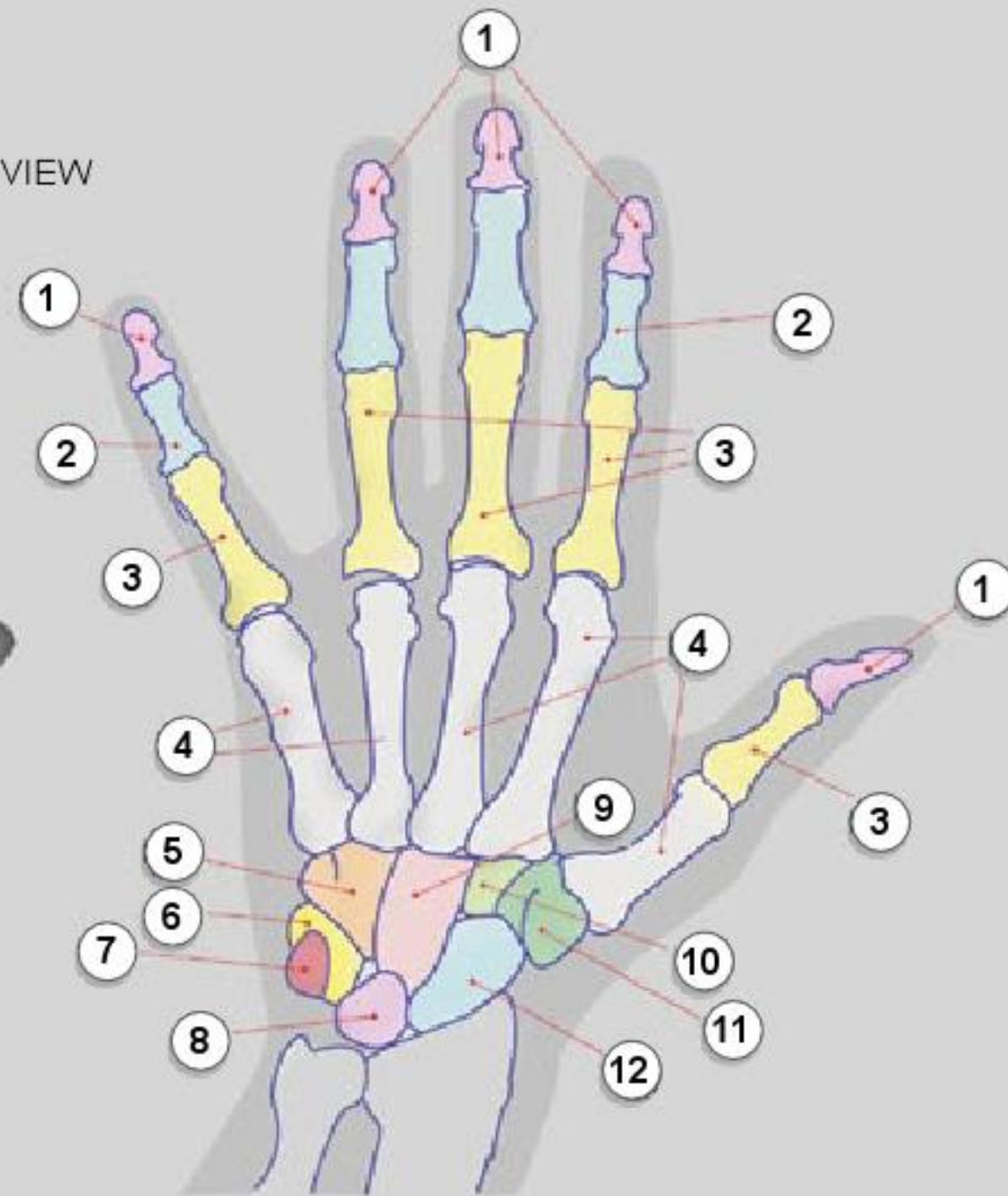
extensor carpi radialis brevis \*  
extensor carpi radialis longus \*\*  
extensor pollicis brevis \*\*\*  
extensor pollicis longus \*\*\*\*  
extensor digitorum \*\*\*\*\*  
extensor digiti minimi \*\*\*\*\*



# HAND AND WRIST BONES



PALMAR VIEW



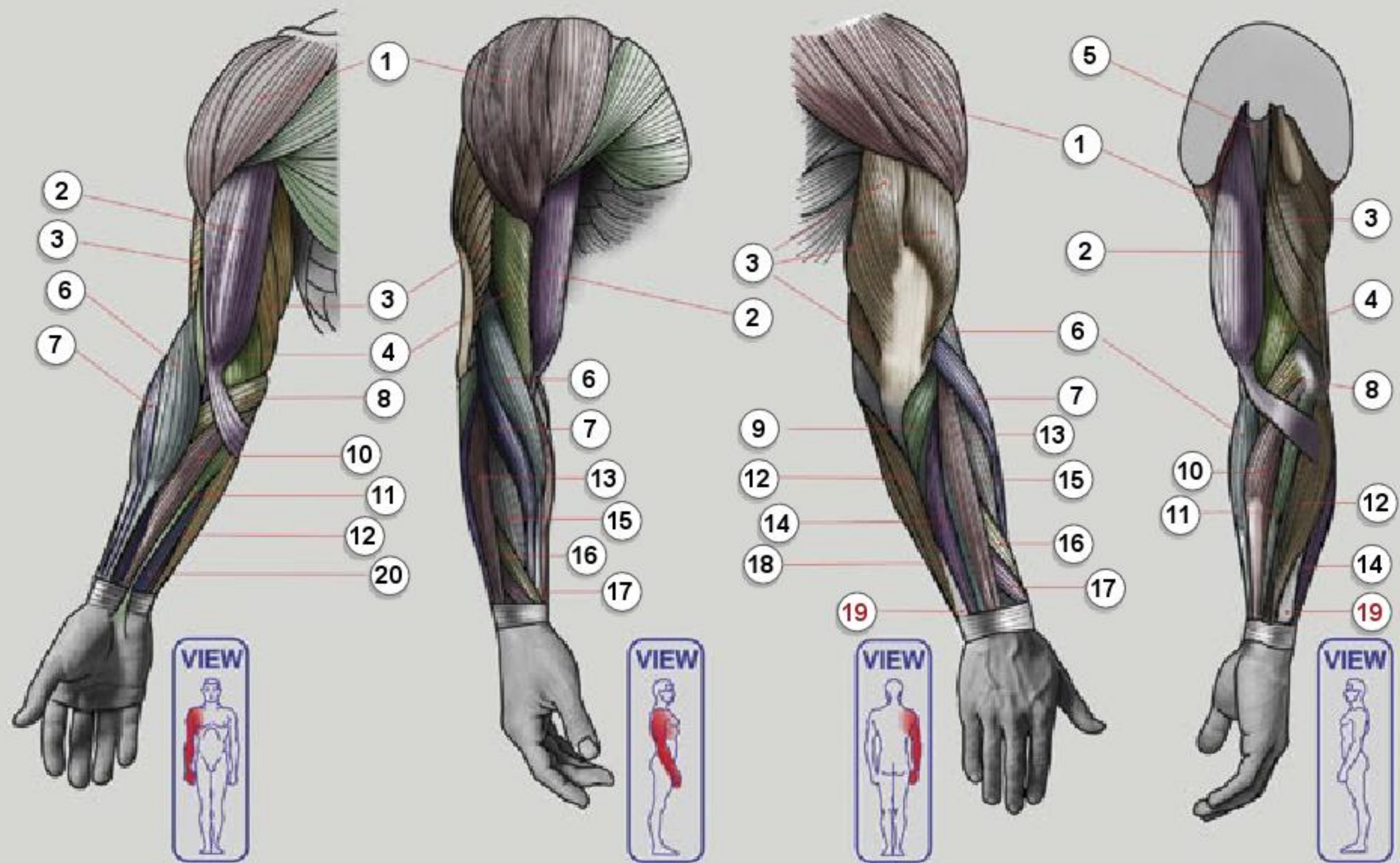
DORSAL VIEW



- |                      |               |            |              |
|----------------------|---------------|------------|--------------|
| 1 DISTAL PHALANGES   | 4 METACARPALS | 7 PISIFORM | 10 TRAPEZOID |
| 2 MIDDLE PHALANGES   | 5 HAMATE      | 8 LUNATE   | 11 TRAPEZIUM |
| 3 PROXIMAL PHALANGES | 6 TRIQUETRUM  | 9 CAPITATE | 12 SCAPHOID  |



## MAJOR MUSCLES OF UPPER LIMB



1 SHOULDER MUSCLE (deltoid)

2 BICEPS BRACHII

3 TRICEPS BRACHII

4 BRACHIALIS

5 CORACOBRACHIALIS

6 BRACHIORADIALIS

7 EXTENSOR CARPI RADIALIS LONGUS

8 PRONATOR TERES

9 ANCONEUS

10 FLEXOR CARPI RADIALIS

11 PALMARIS LONGUS

12 FLEXOR CARPI ULNARIS

13 EXTENSOR DIGITORUM

14 EXTENSOR CARPI ULNARIS

15 EXTENSOR CARPI RADIALIS BREVIS

16 ABDUCTOR POLLICIS LONGUS

17 EXTENSOR POLLICIS BREVIS

18 EXTENSOR DIGITI MINIMI

19 THE HEAD OF ULNA BONE

20 FLEXOR DIGITORUM SUPERFICIALIS



## SUPINATION AND PRONATION

i

IN THE POSITION OF THE ARM CALLED **SUPINATION**, THE **RADIUS** AND **ULNA** ARE PARALLEL, THE PALM OF THE HAND FACES FORWARD OR UPWARD, AND THE THUMB IS AWAY FROM THE BODY. IN THE POSITION CALLED **PRONATION**, THE **RADIUS** AND **ULNA** ARE CROSSED, THE PALM FACES TO THE REAR OR DOWNWARD, AND THE THUMB IS TOWARD THE BODY.

**SUPINATION** – LIKE YOU'RE A WAITER CARRYING SOUP.

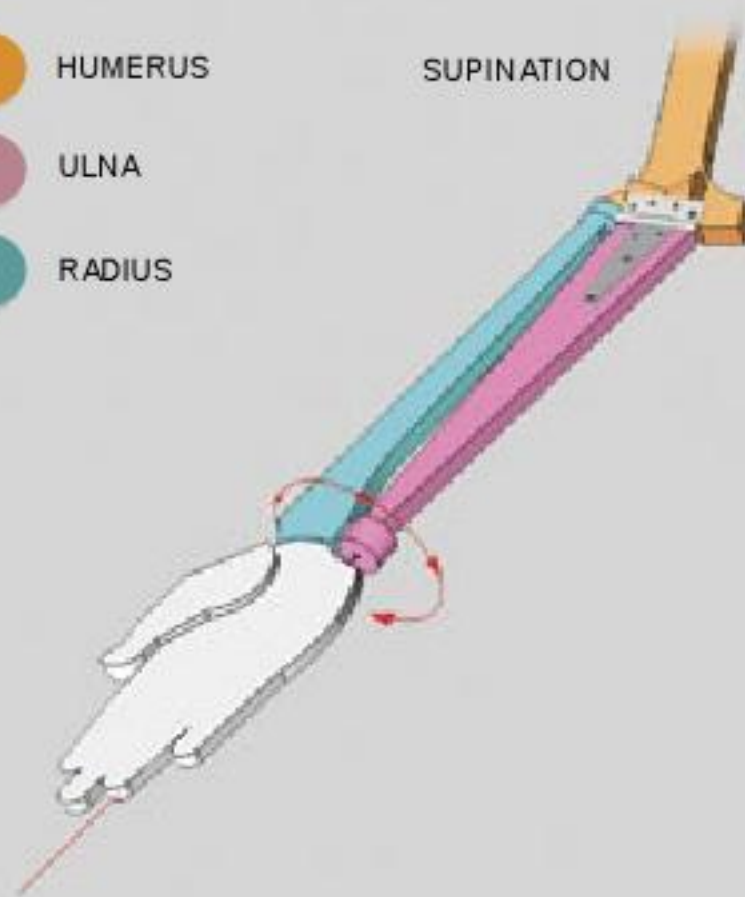


**PRONATION** – LIKE YOU'RE A PRO BASKETBALL PLAYER.

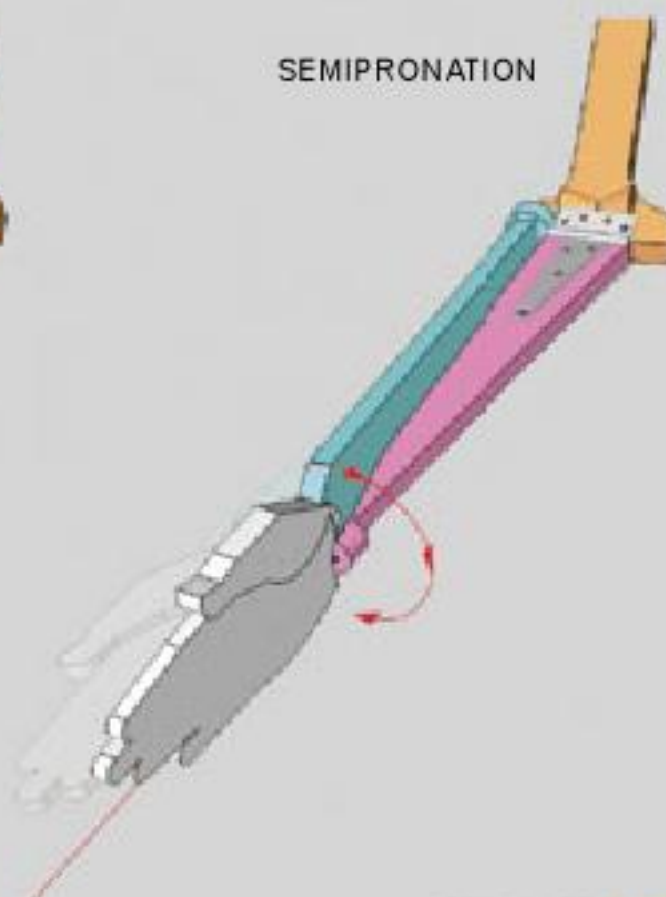


NOTE THAT PRONATION OF THE FOREARM DOES NOT INVOLVE ROTATION OF THE UPPER-ARM FROM THE SHOULDER JOINT!

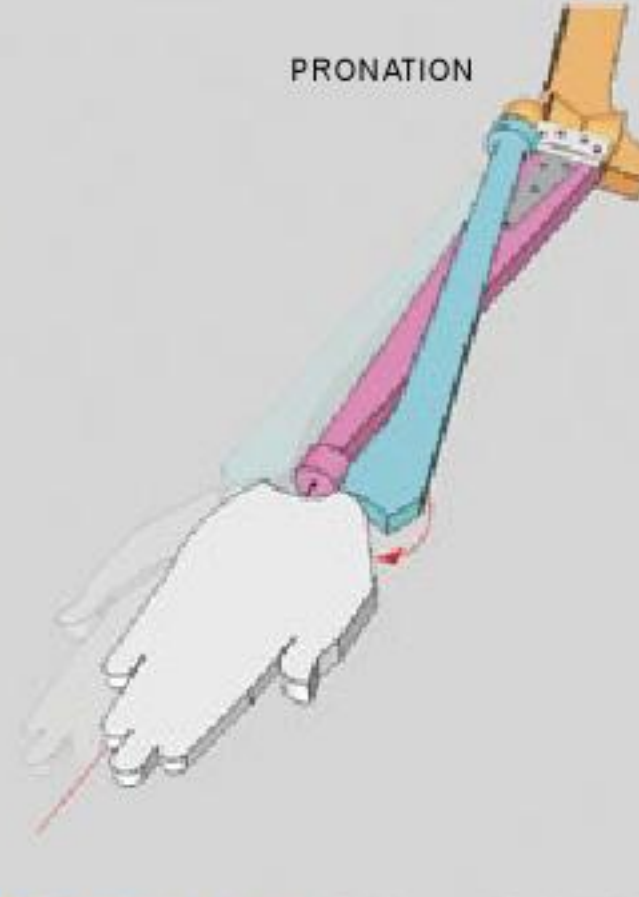
- HUMERUS
- ULNA
- RADIUS



SUPINATION



SEMI PRONATION



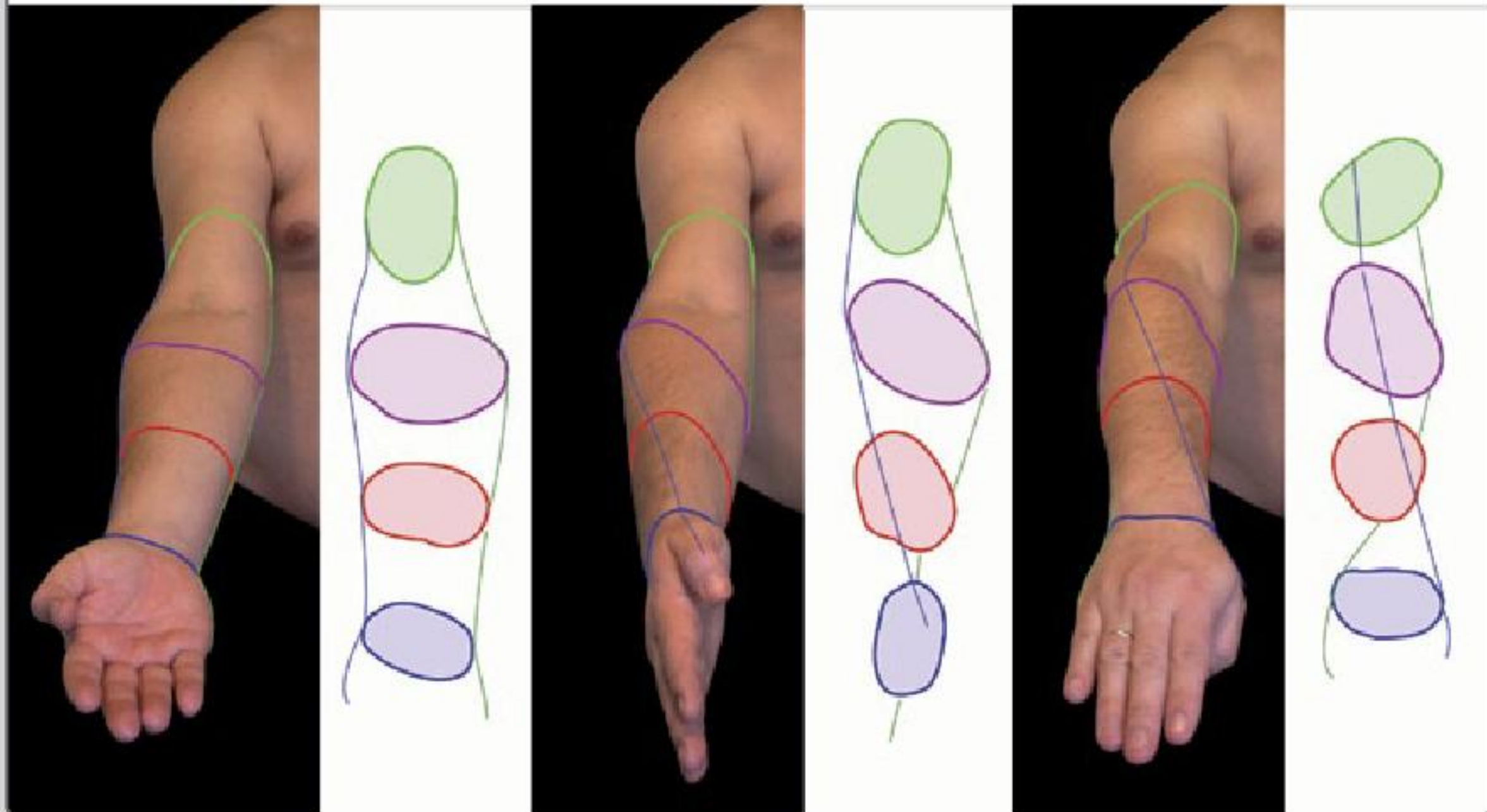
PRONATION

DURING **PRONATION**, **RADIUS** ROLLS AROUND **THE ULNA**

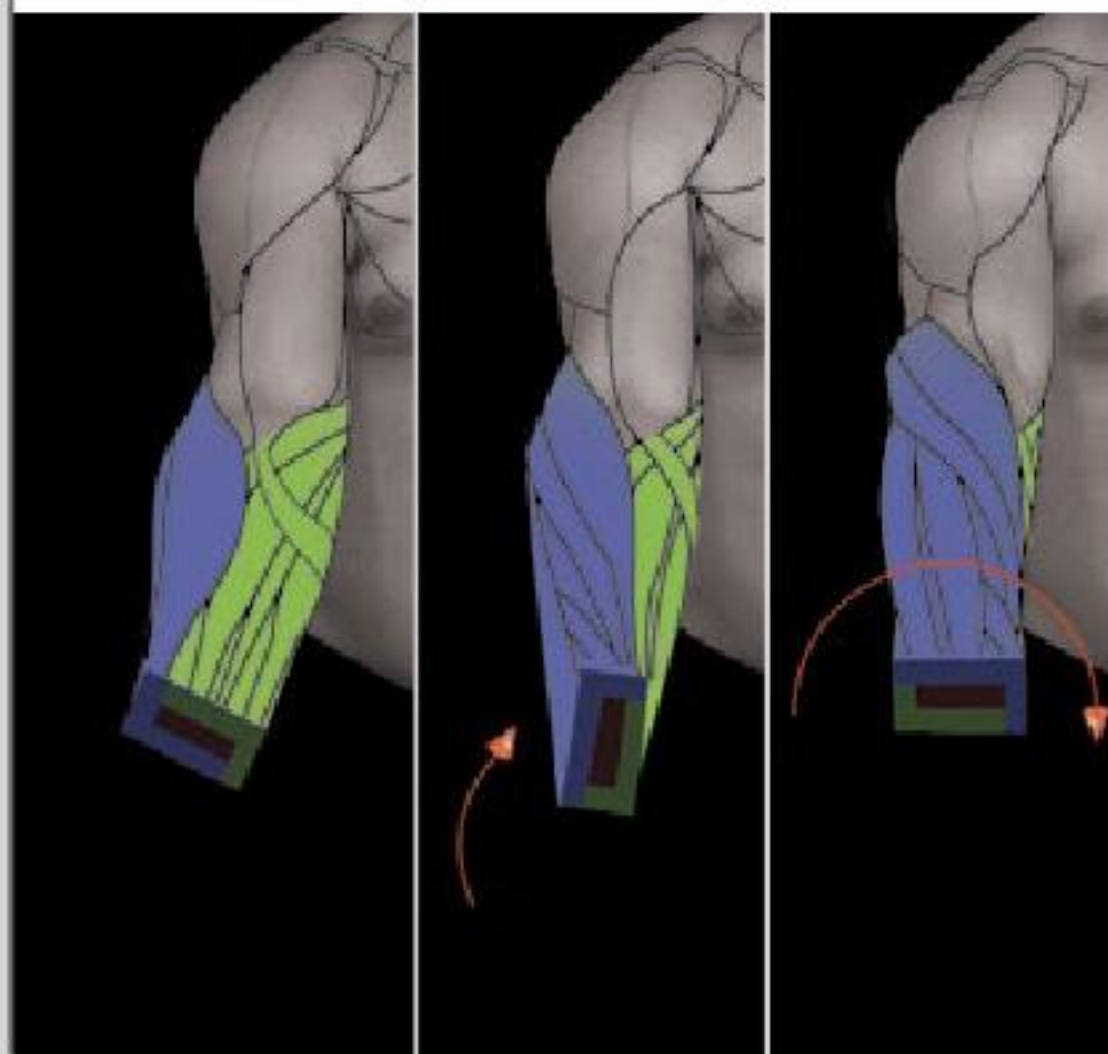


## PRONATION AND FORM CHANGES

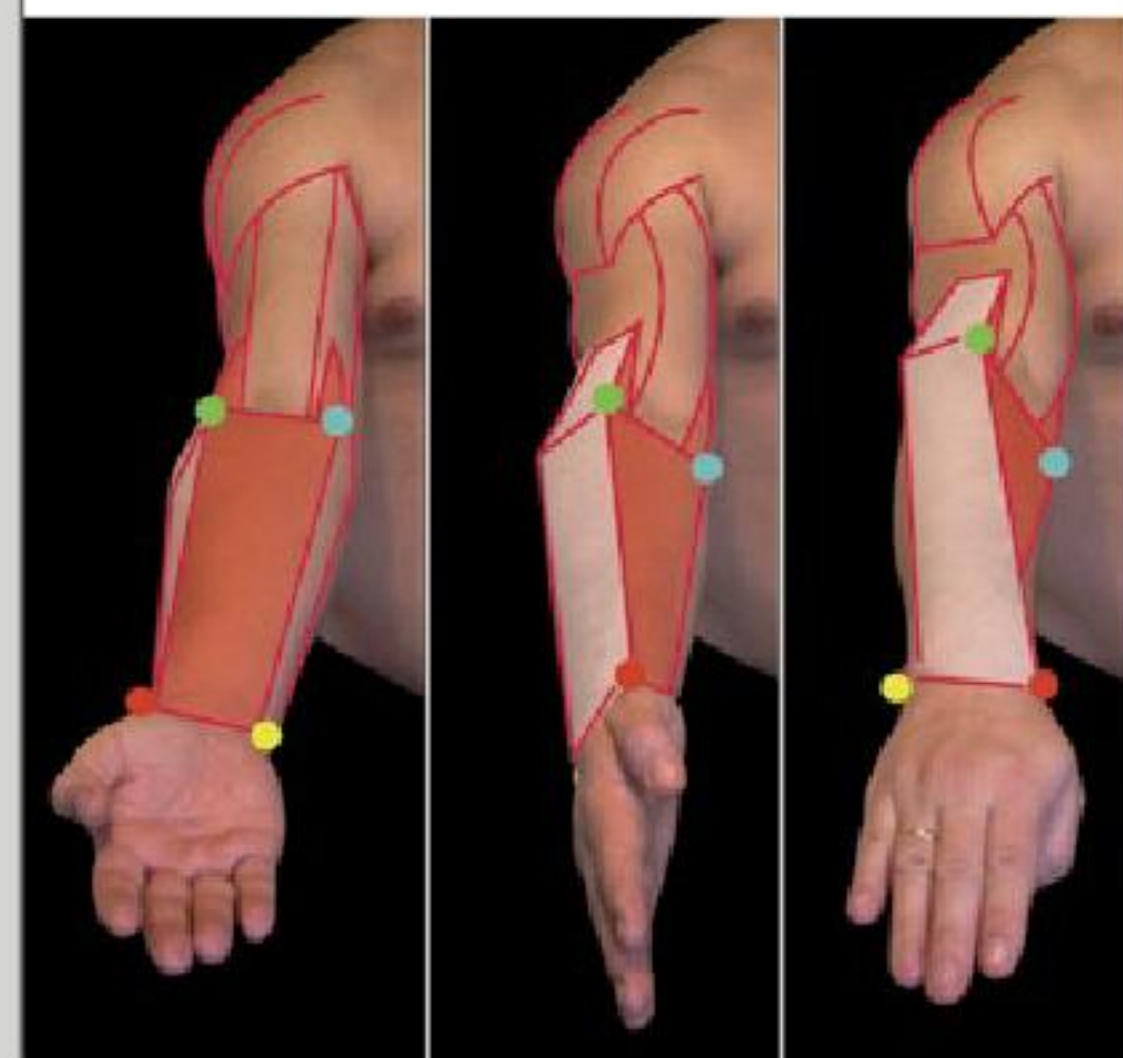
CROSS SECTIONS OF ARM DURING PRONATION



FLEXORS AND EXTENSORS



THIS IS AN EXAMPLE OF HOW IMPORTANT IT IS TO KNOW THE ORIGIN AND INSERTION POINTS OF MUSCLES.

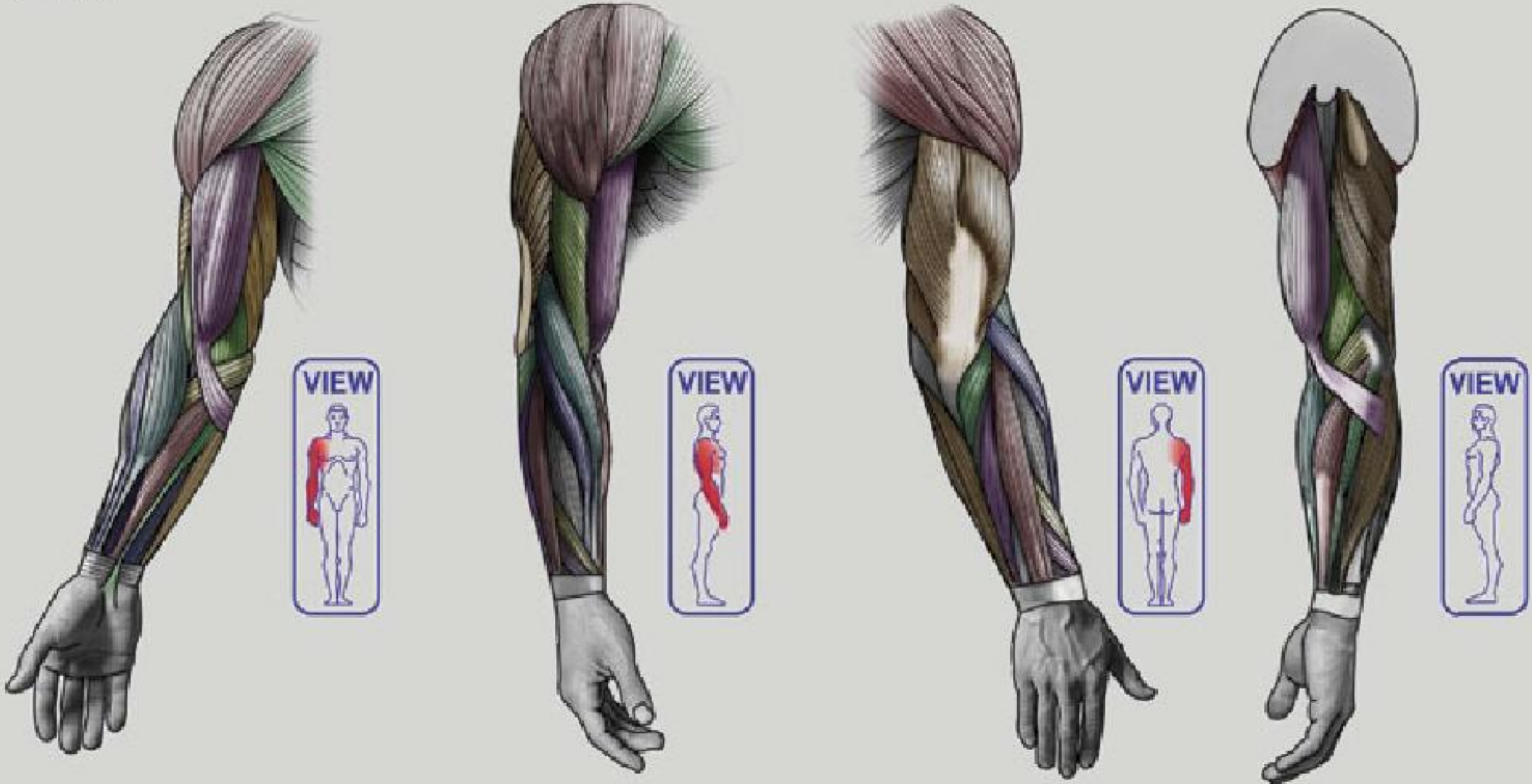




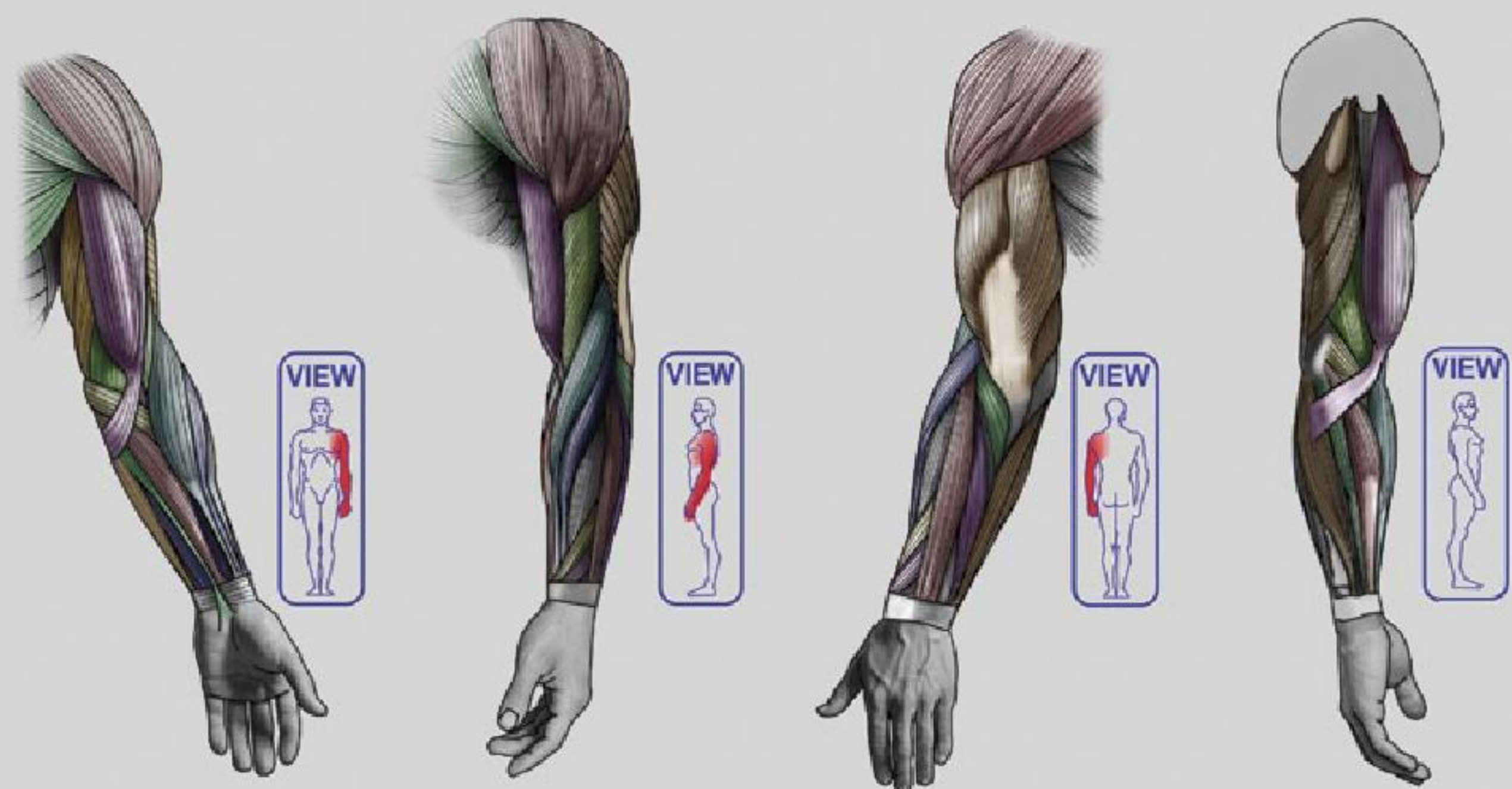
## SUPINATED UPPER LIMB

(WHEN THE FOREARM OR PALM FACES TOWARD THE FRONT)

RIGHT



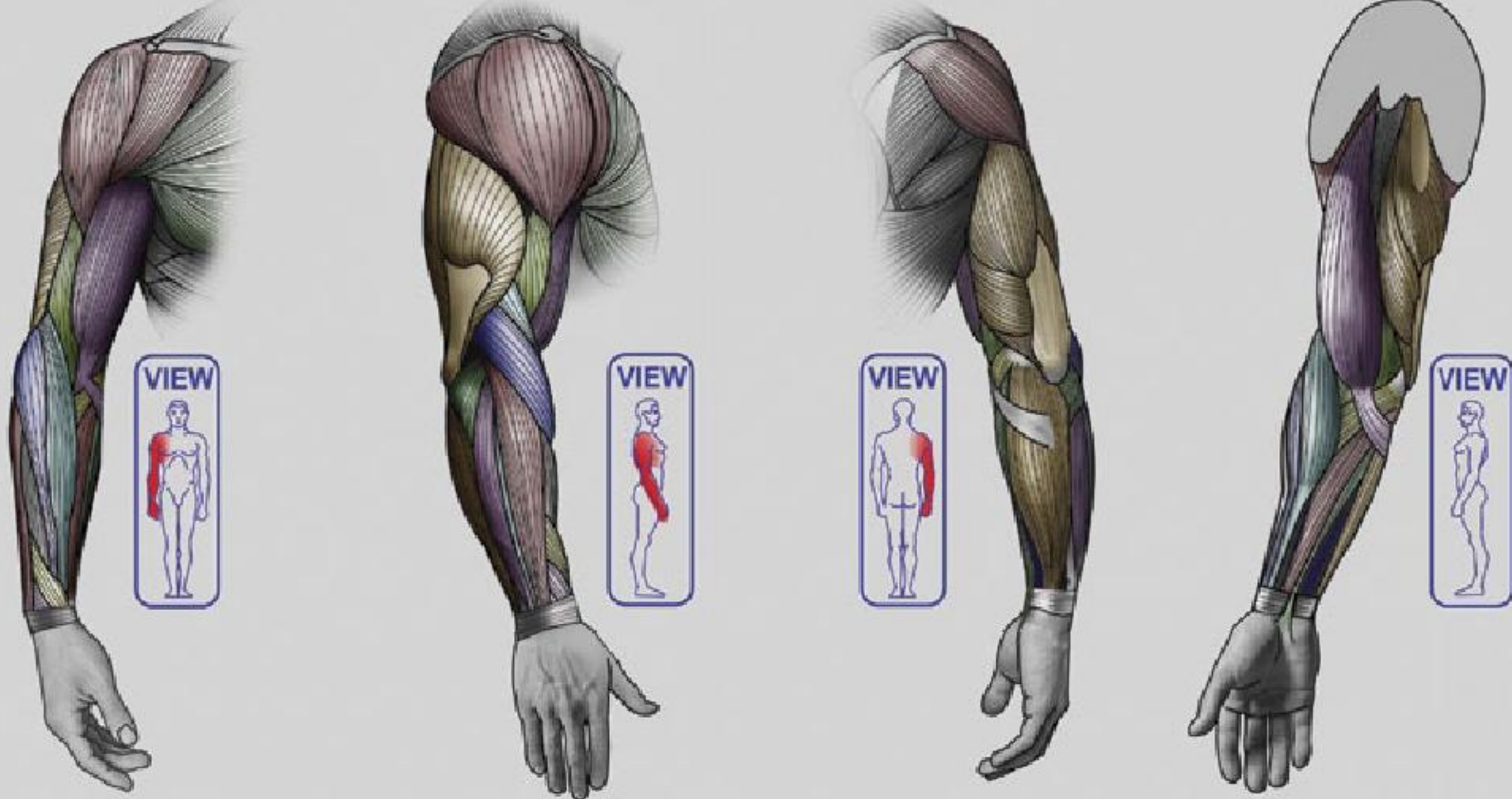
LEFT



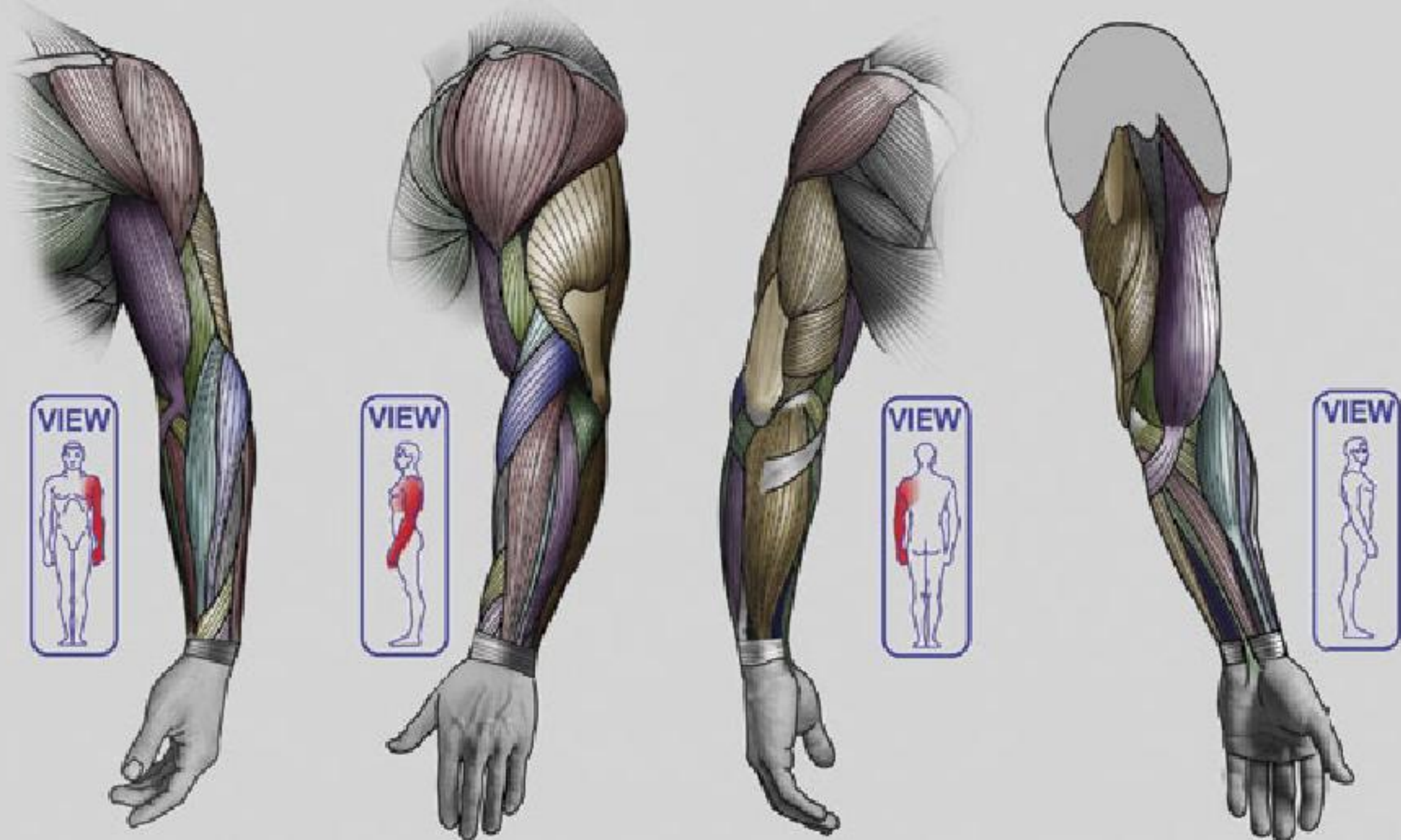


## SEMIPRONATED UPPER LIMB (WHEN THE FOREARM OR PALM FACES TOWARD THE TRUNK)

RIGHT



LEFT

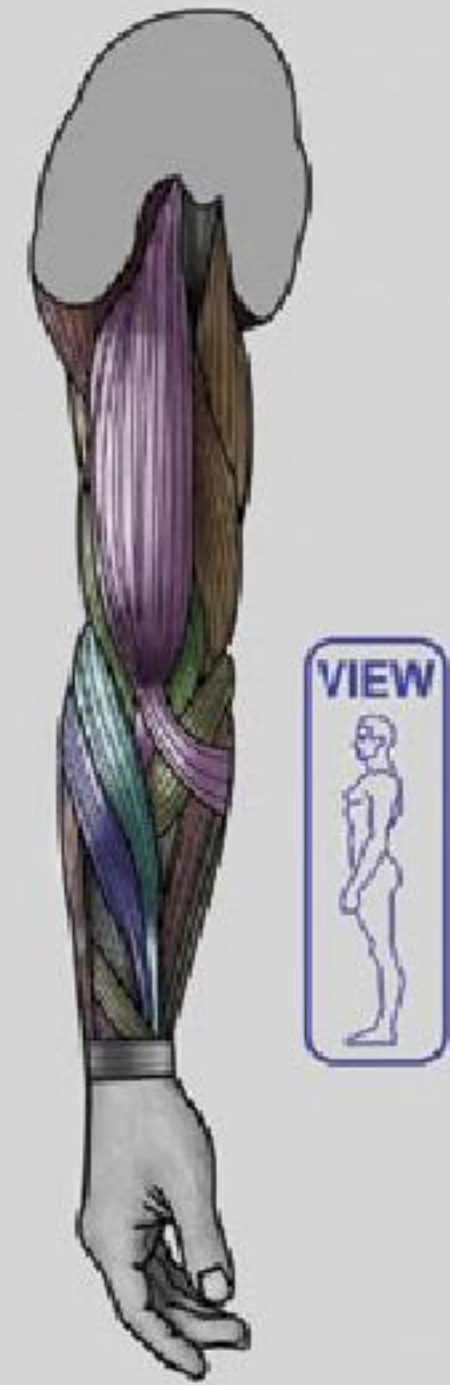
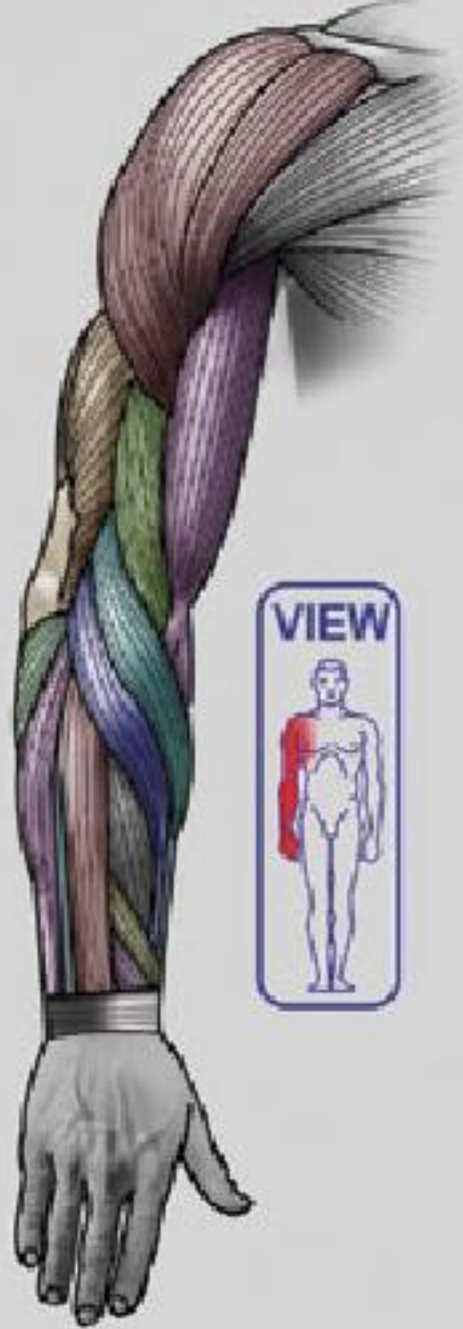




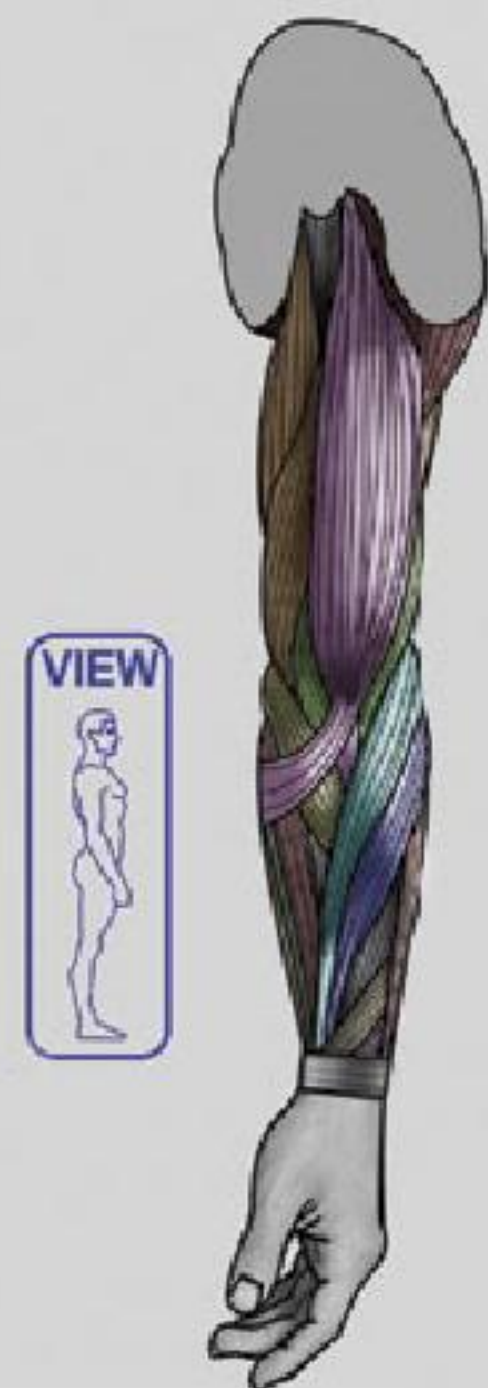
## PRONATED UPPER LIMB

(WHEN FOREARM OR PALM FACES TOWARD THE BACK)

RIGHT



LEFT

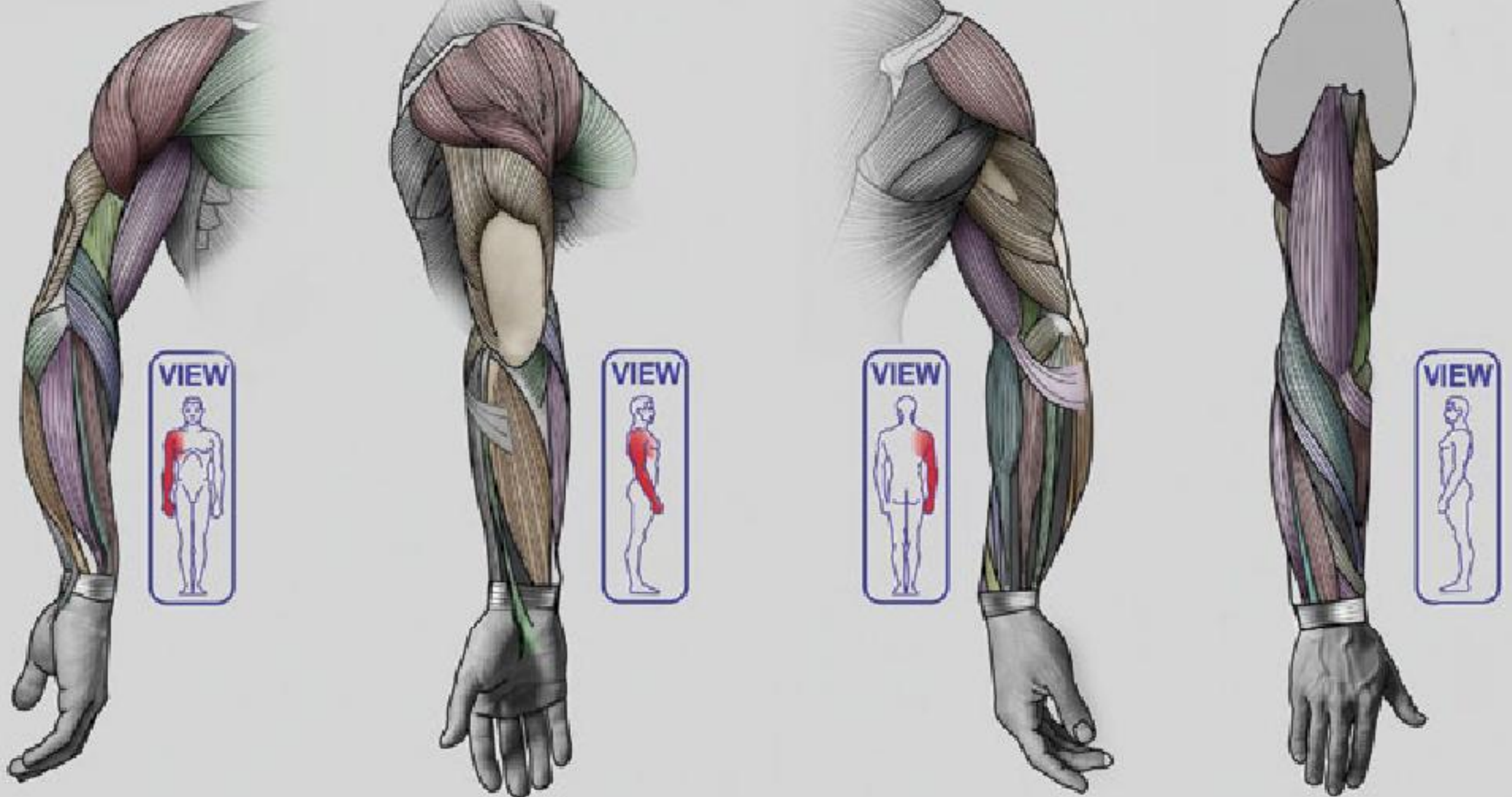




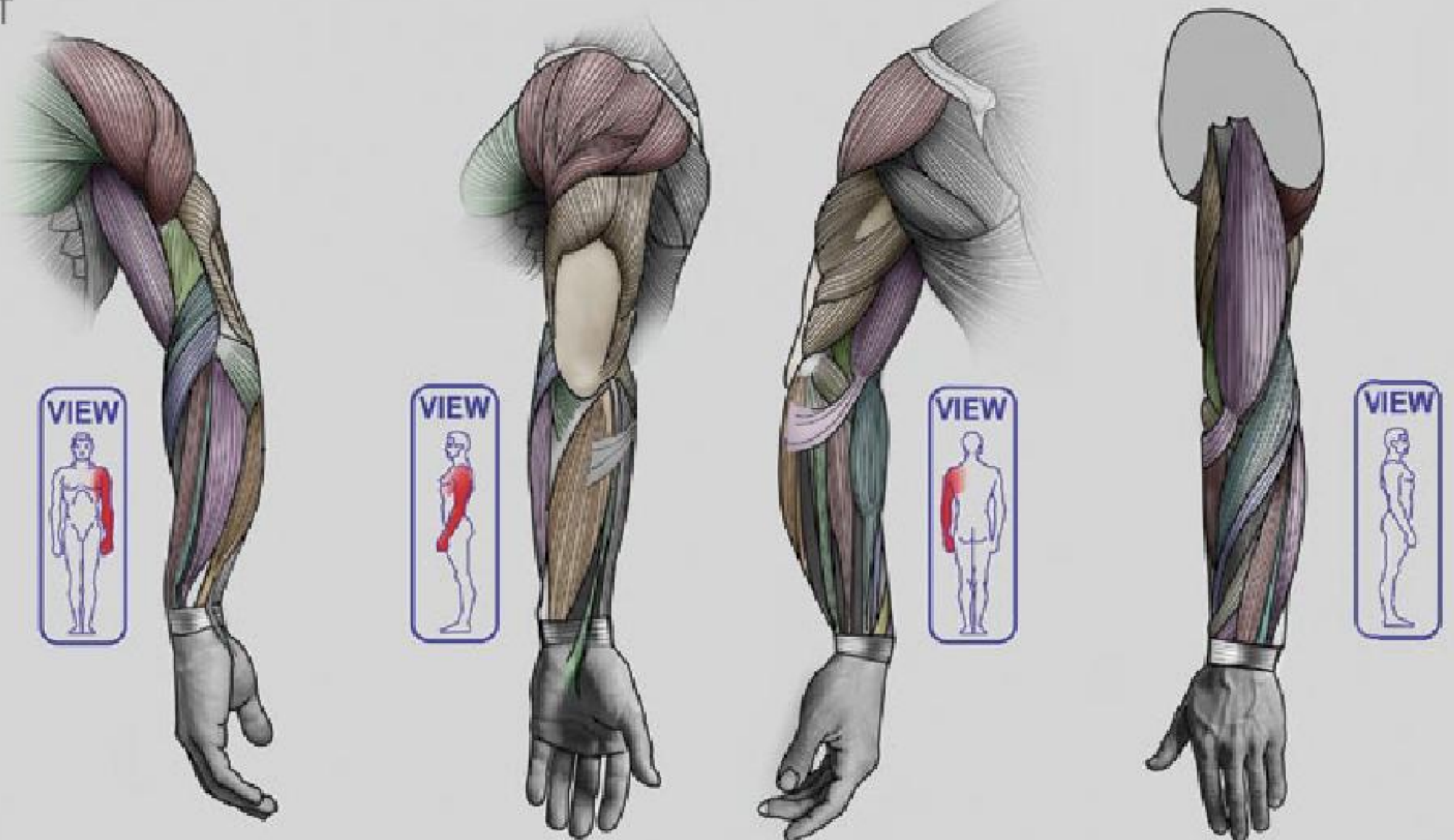
## FORCED PRONATION OF THE UPPER LIMB

(WHEN THE FOREARM OR PALM FACES AWAY FROM THE TRUNK)

RIGHT

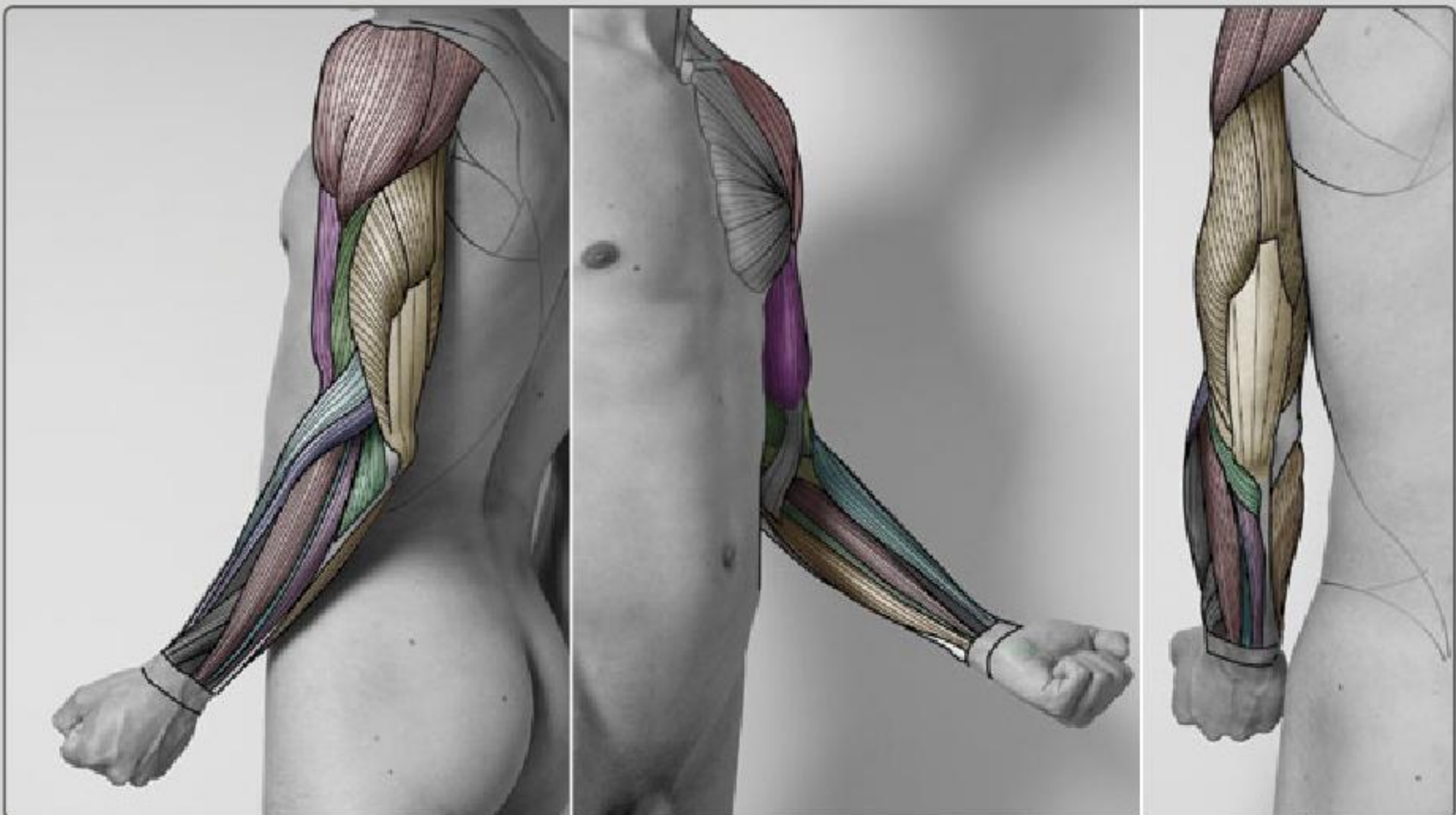


LEFT



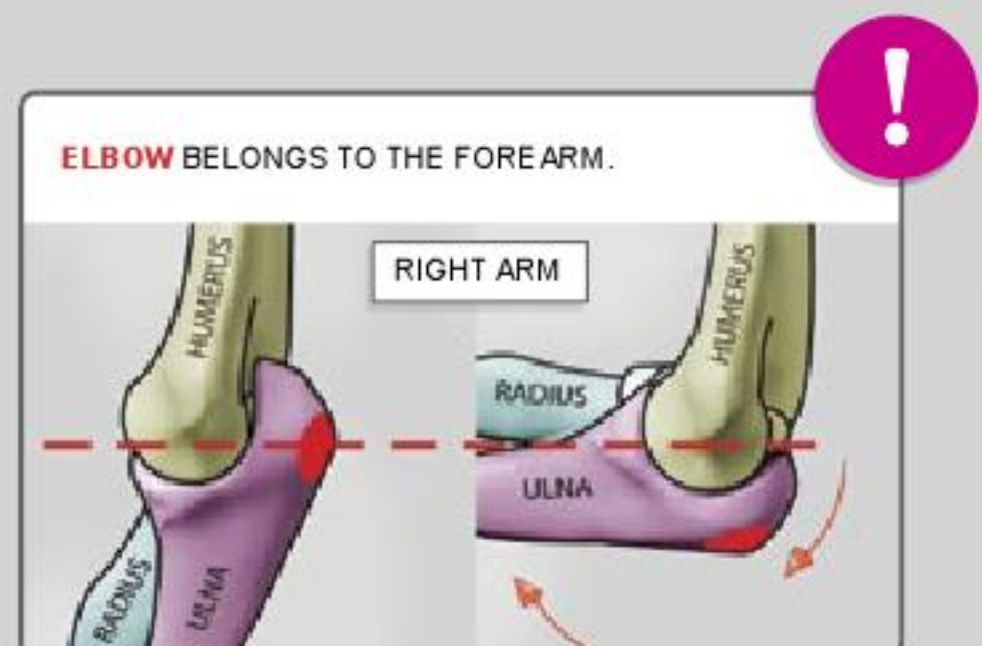
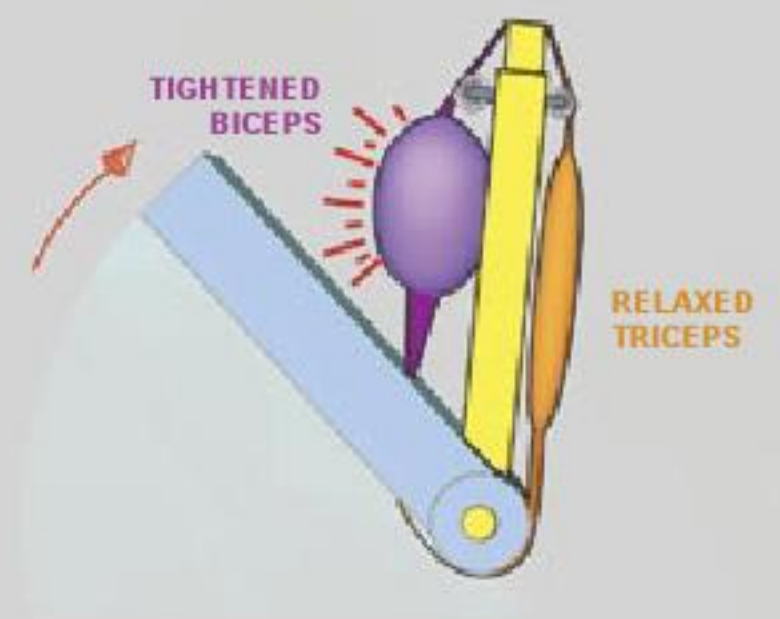
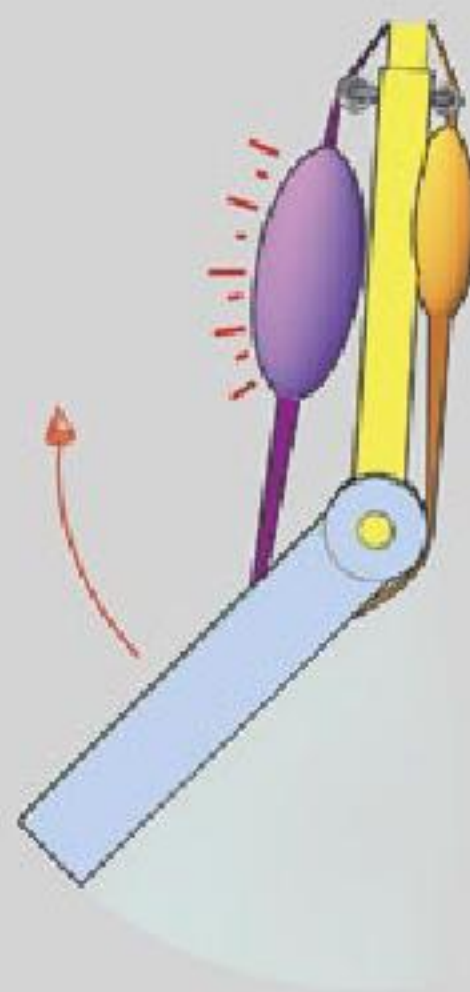
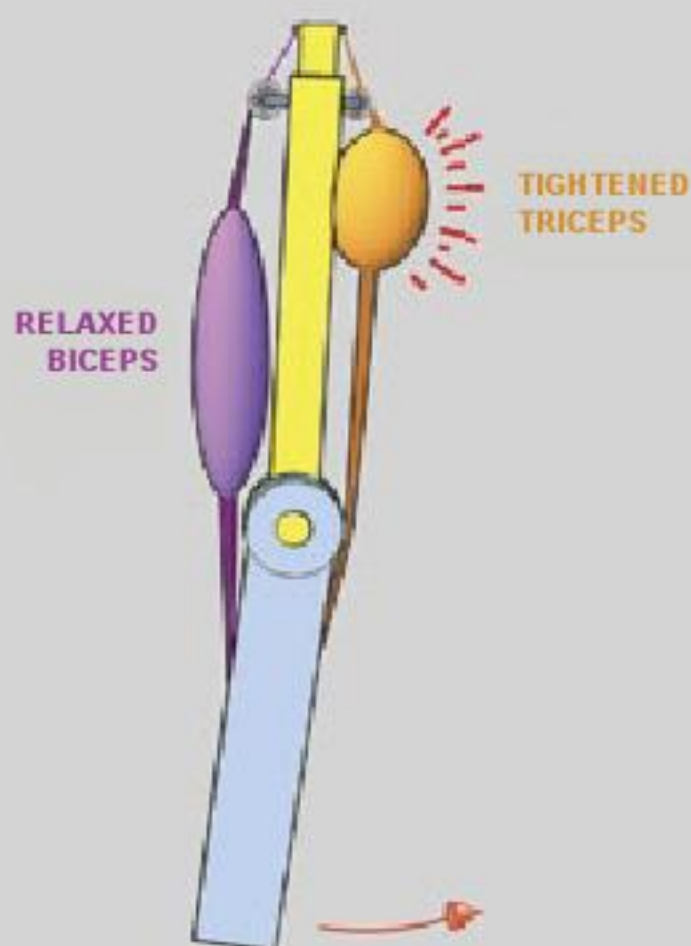
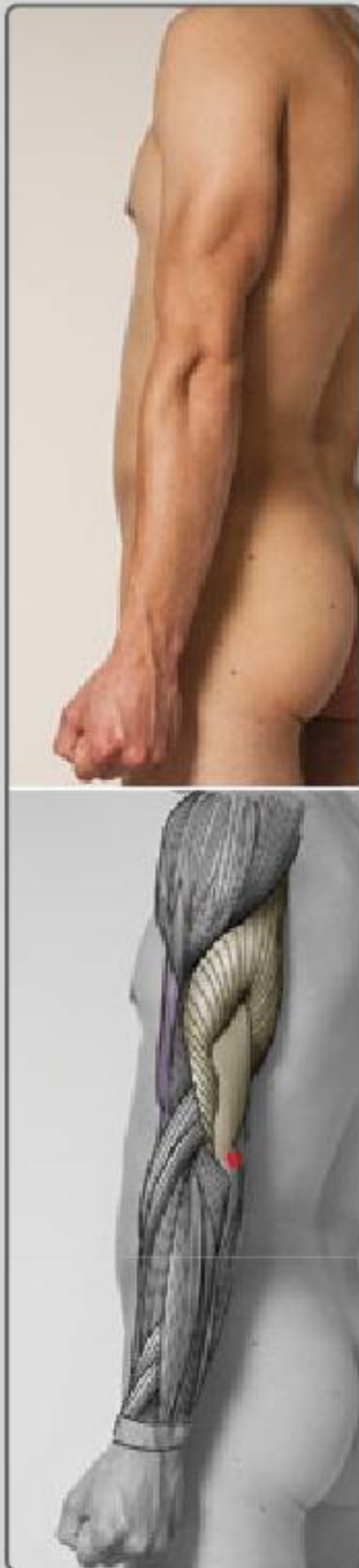


## PARTIALLY FLEXED ARM (AS IF HOLDING AN OBJECT)

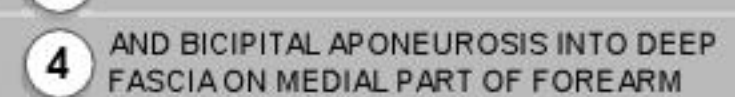




## BICEPS AND TRICEPS IN ACTION

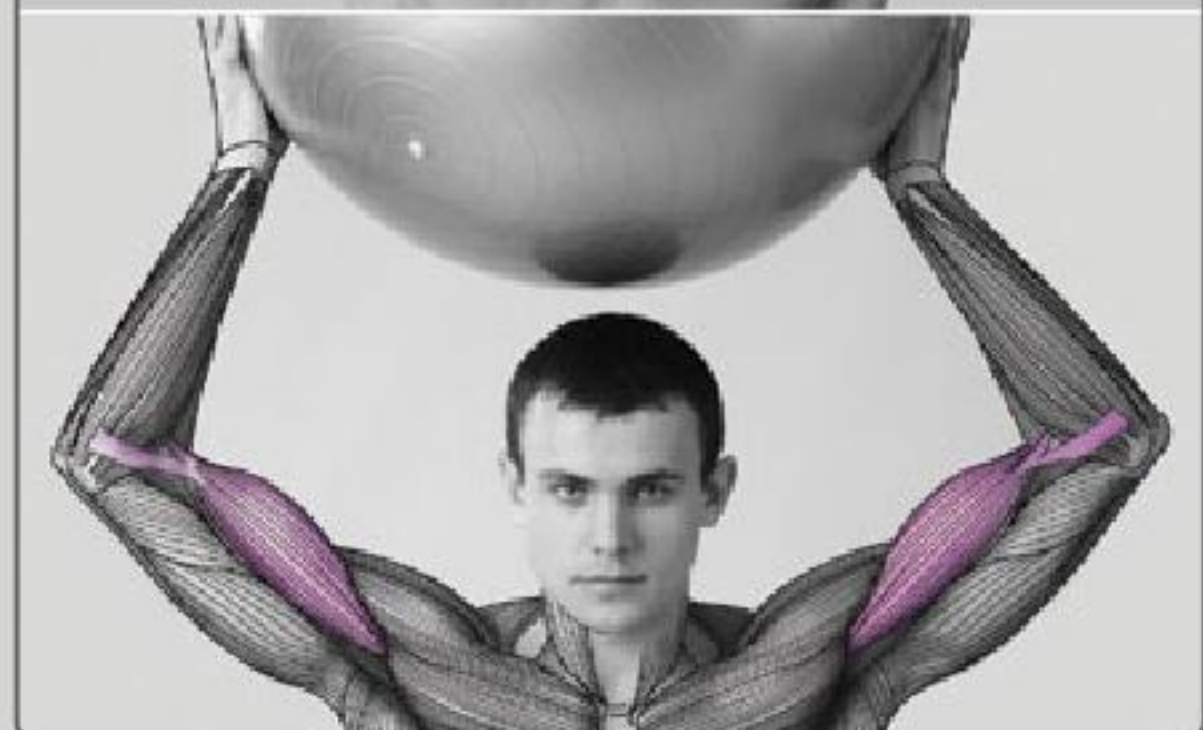
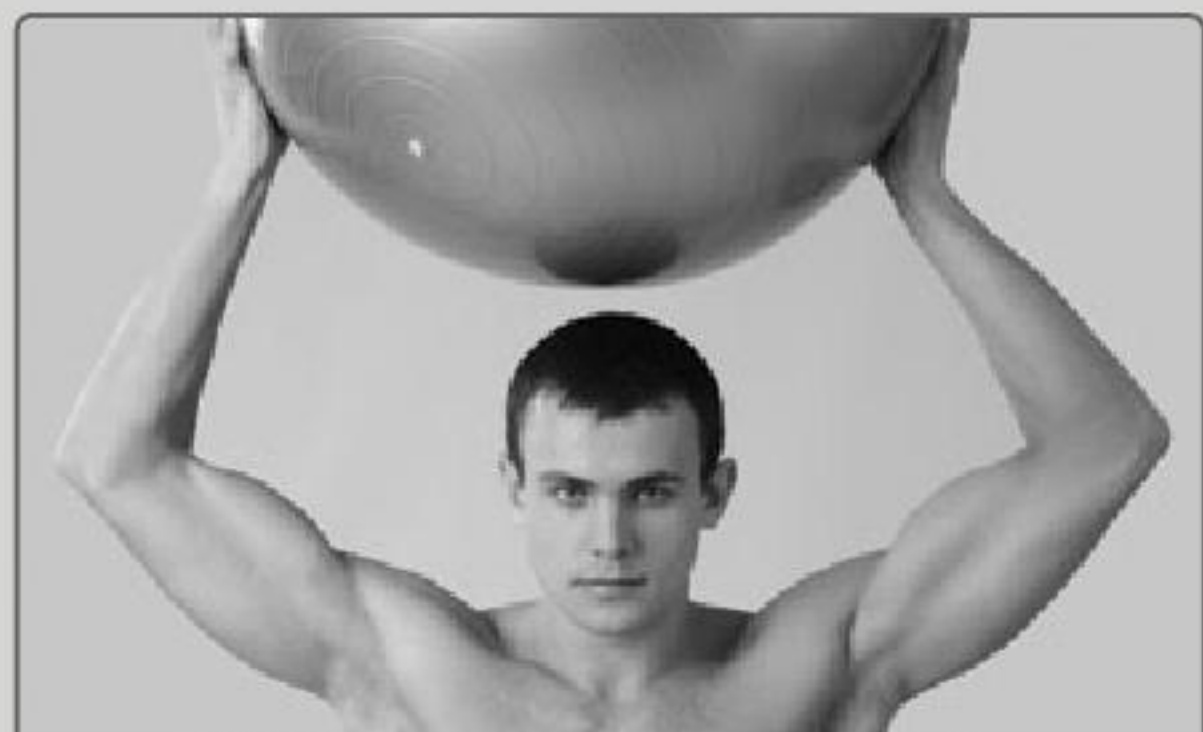
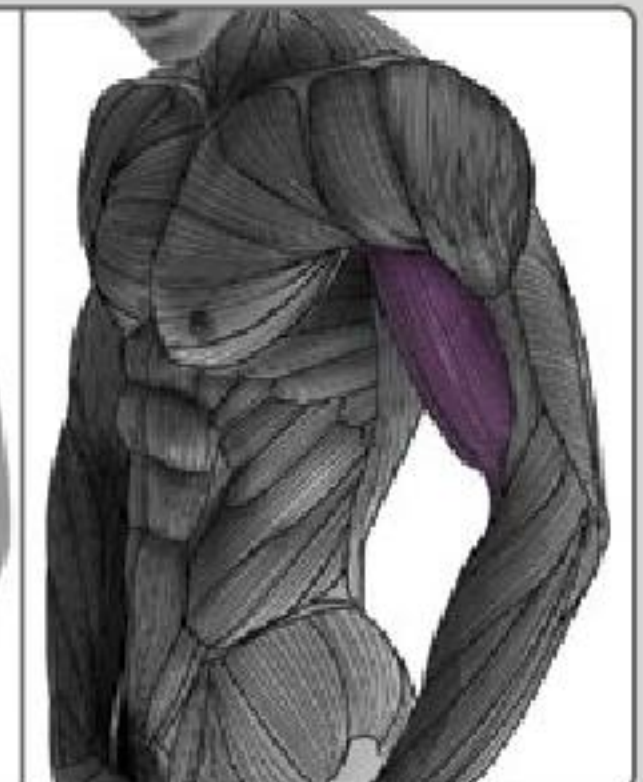
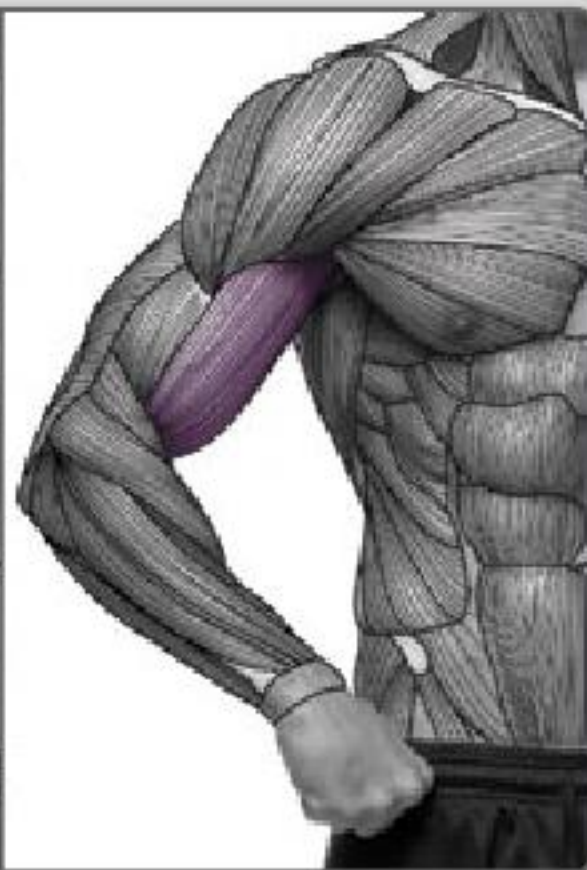
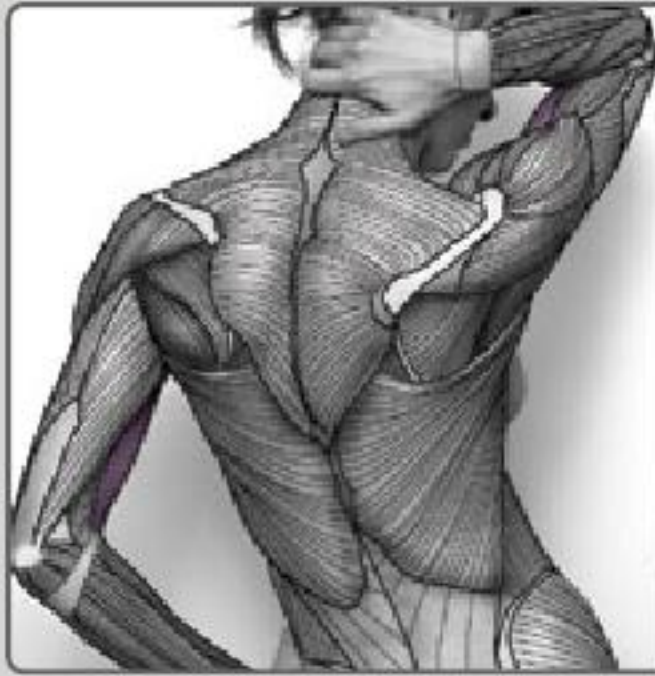






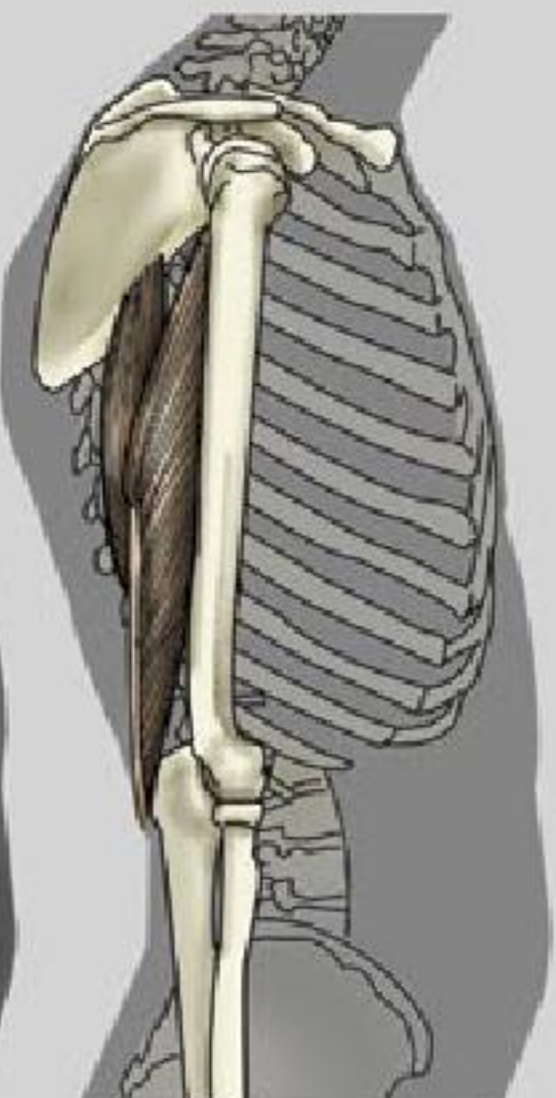
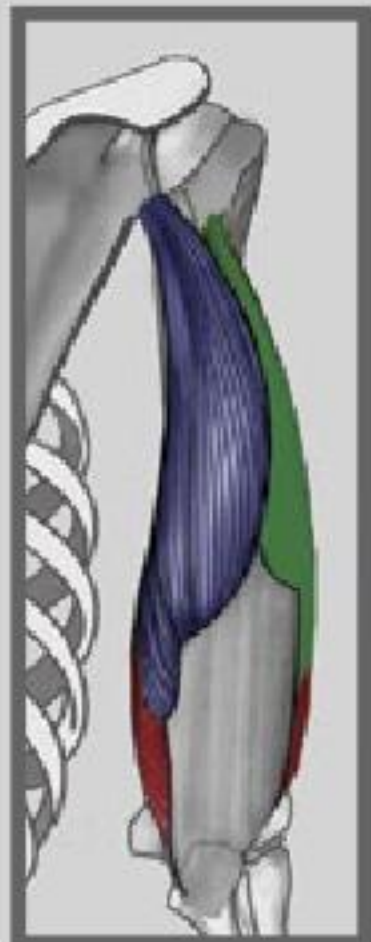
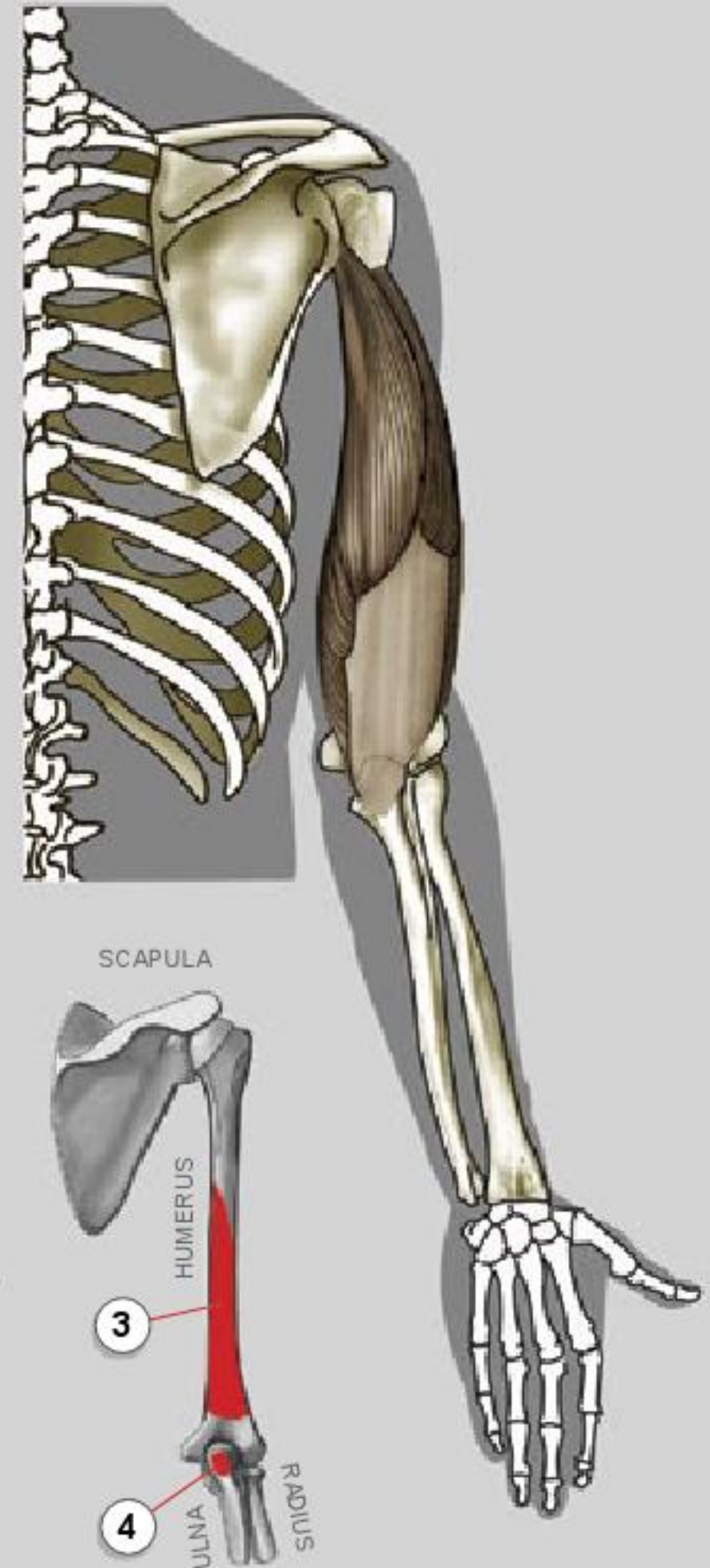
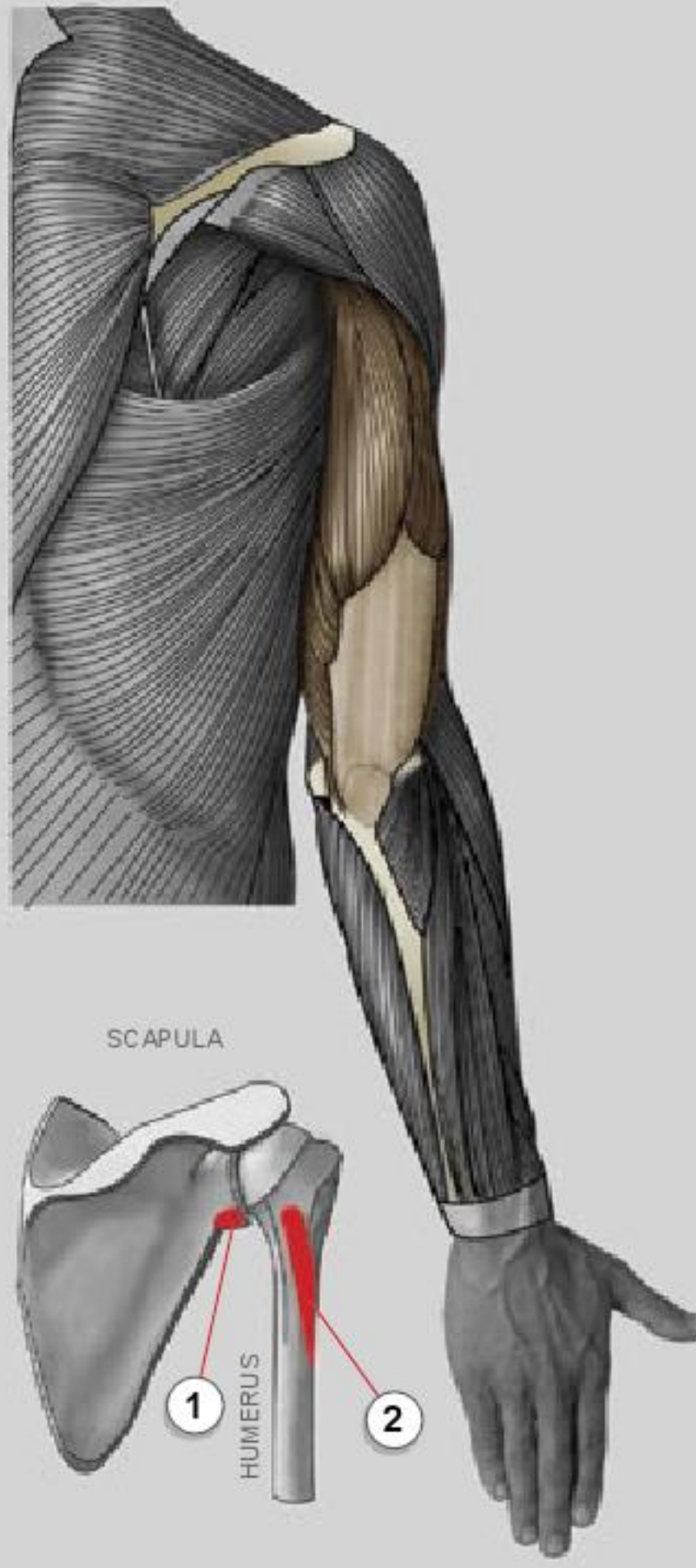


## BICEPS BRACHII MUSCLE





## TRICEPS BRACHII MUSCLE



### ACTION:

EXTENDS FOREARM  
**LONG HEAD** EXTENDS SHOULDER

### ORIGIN:

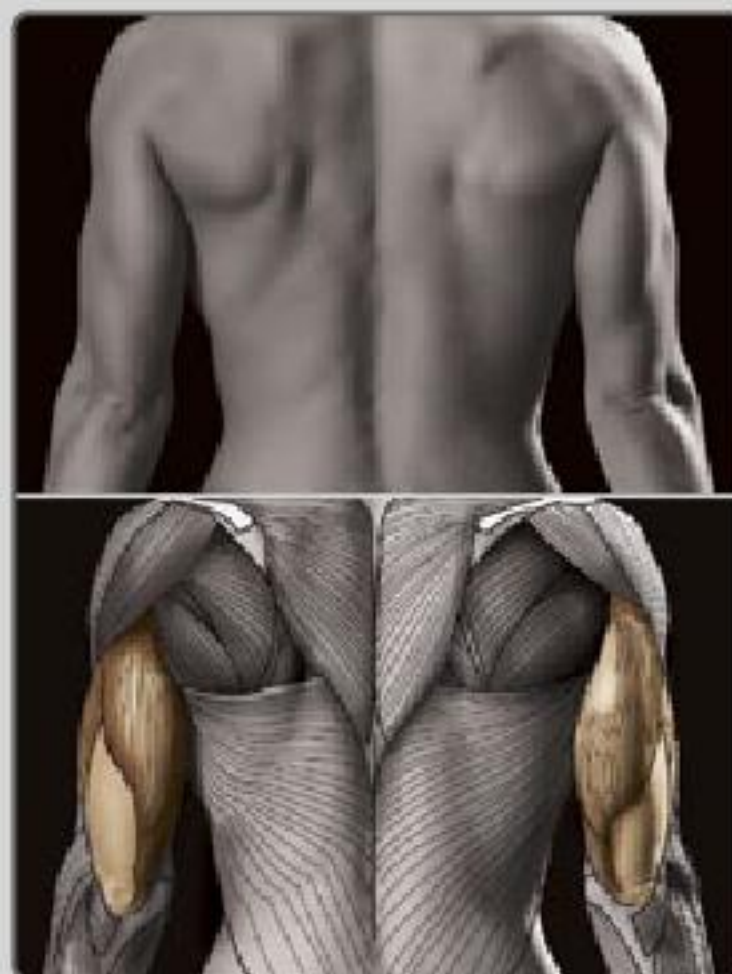
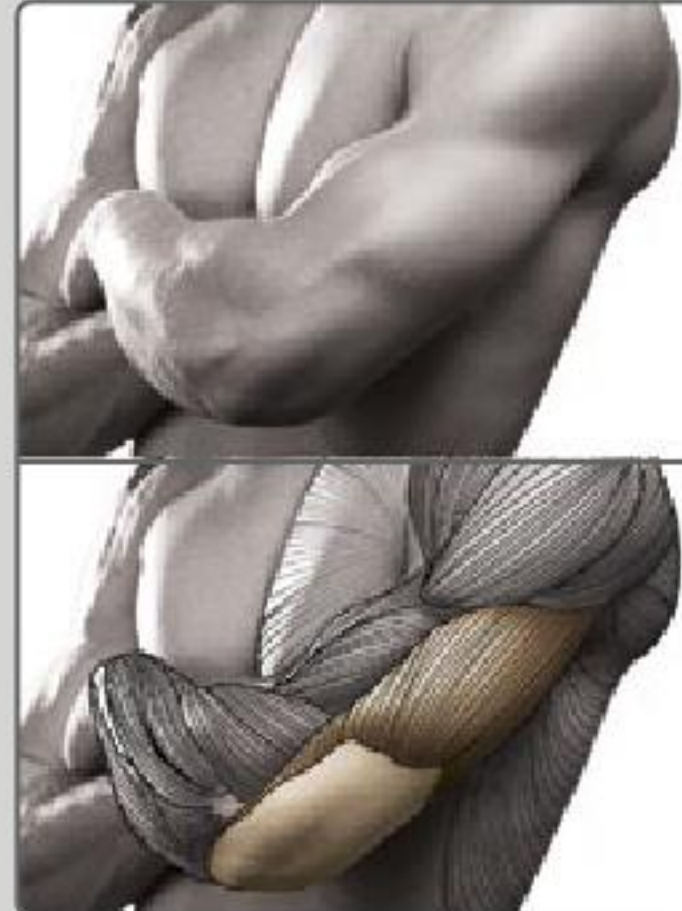
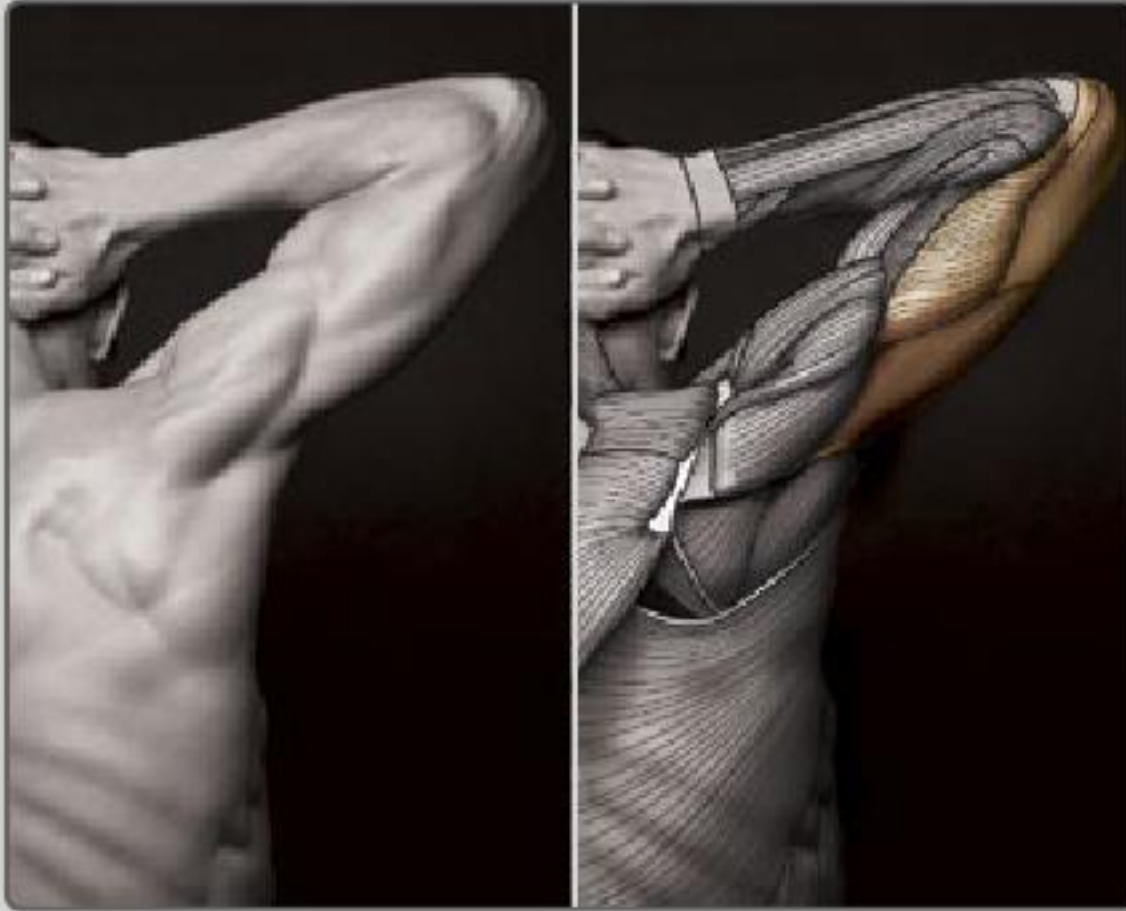
- 1 **LONG HEAD:**  
INFRAGLENOID TUBERCLE OF SCAPULA
- 2 **LATERAL HEAD:**  
ABOVE THE RADIAL SULCUS
- 3 **MEDIAL HEAD:**  
BELOW THE RADIAL SULCUS

### INSERTION:

- 4 OLECRANON PROCESS OF ULNA

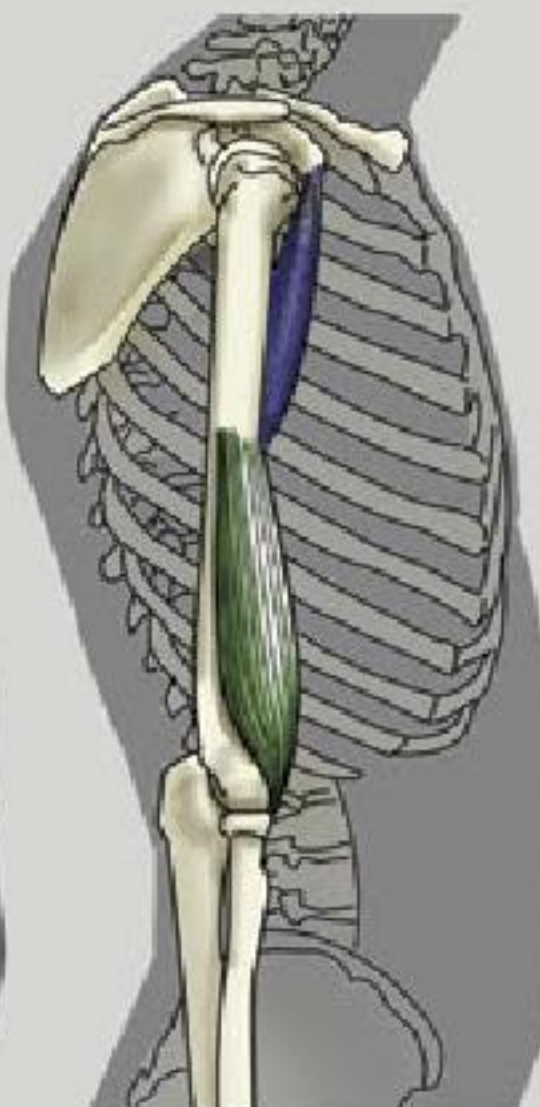
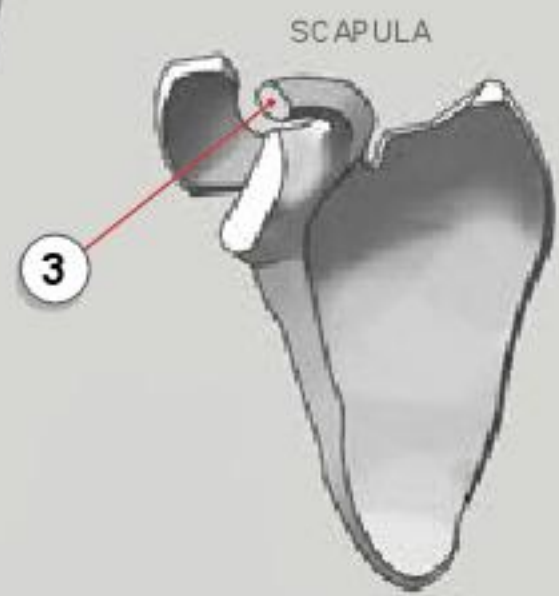
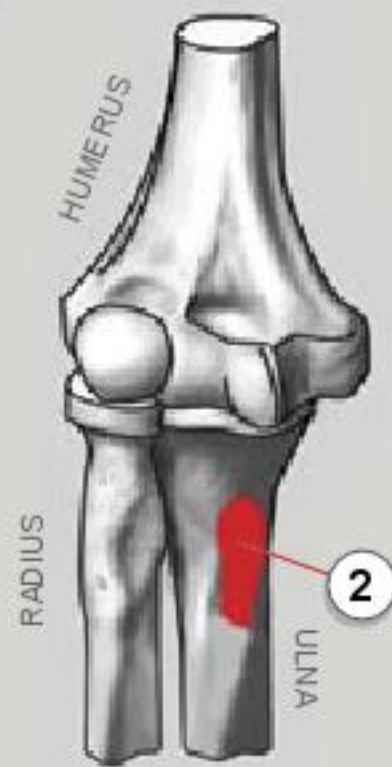
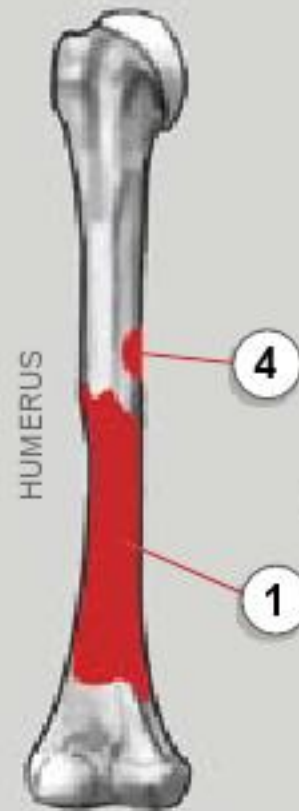
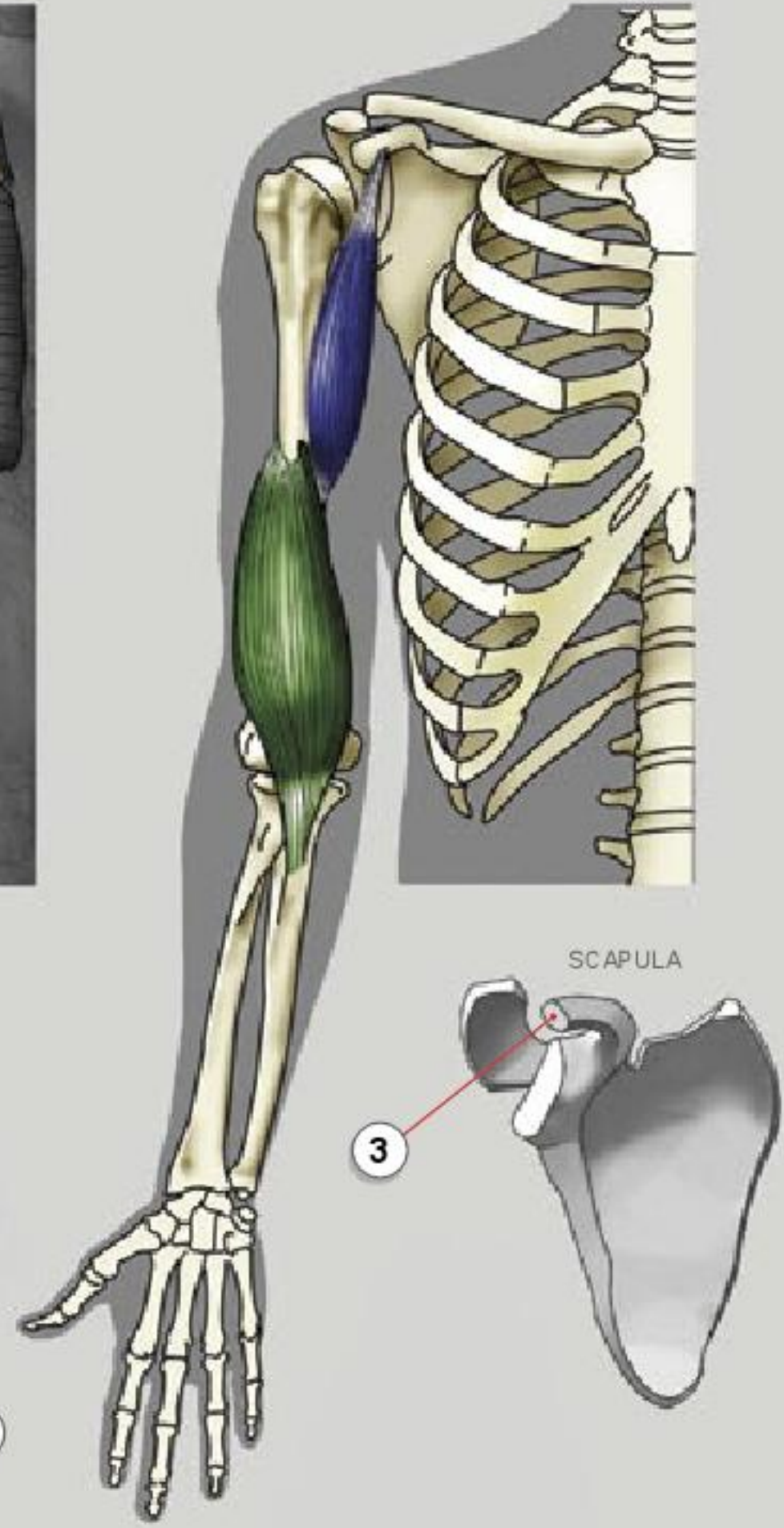
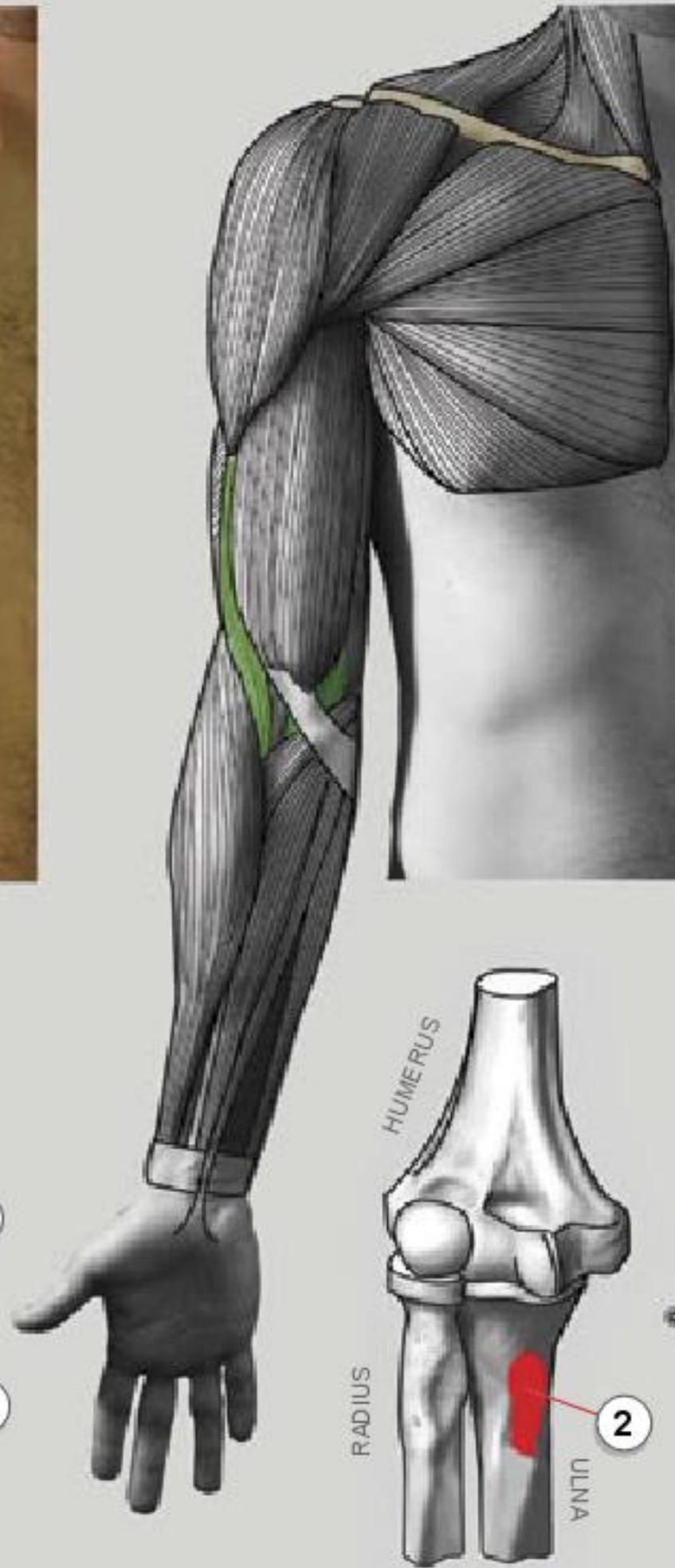


## TRICEPS BRACHII MUSCLE





## BRACHIALIS AND CORACOBRA CHIALIS MUSCLES



### BRACHIALIS

#### ACTION:

FLEXION AT ELBOW JOINT

#### ORIGIN:

1 ANTERIOR SURFACE OF THE HUMERUS

#### INSERTION:

2 CORONOID PROCESS AND THE TUBEROSITY OF THE ULNA

### CORACOBRA CHIALIS

#### ACTION:

ADDUCTS HUMERUS, FLEXES THE ARM AT GLENOHUMERAL JOINT

#### ORIGIN:

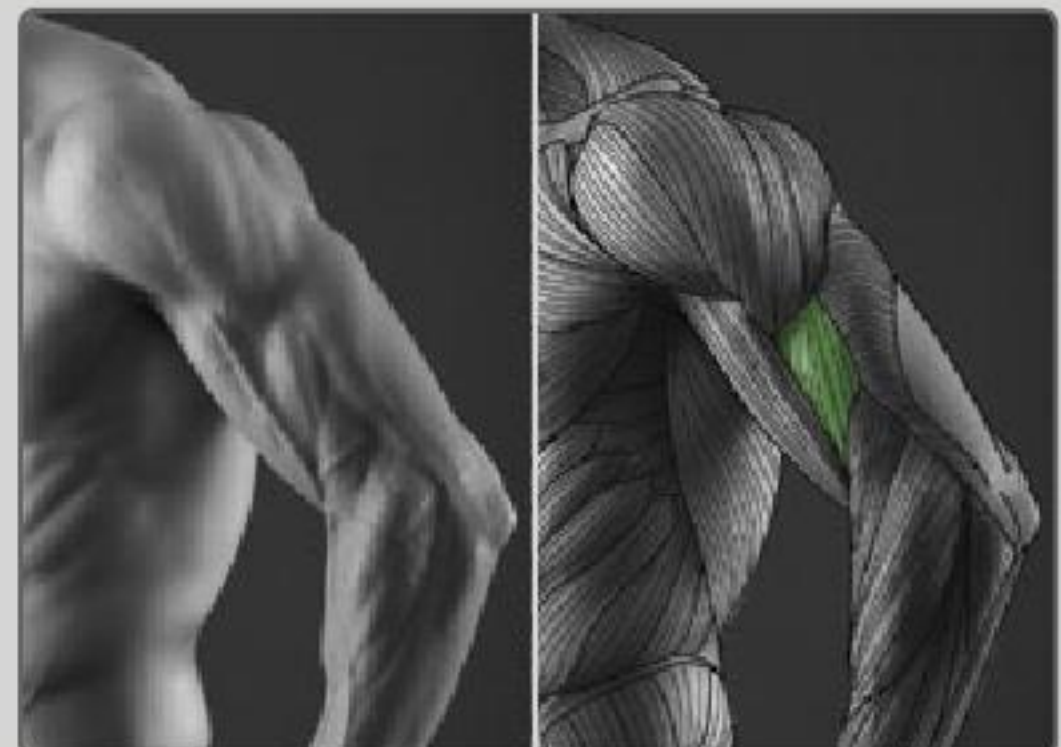
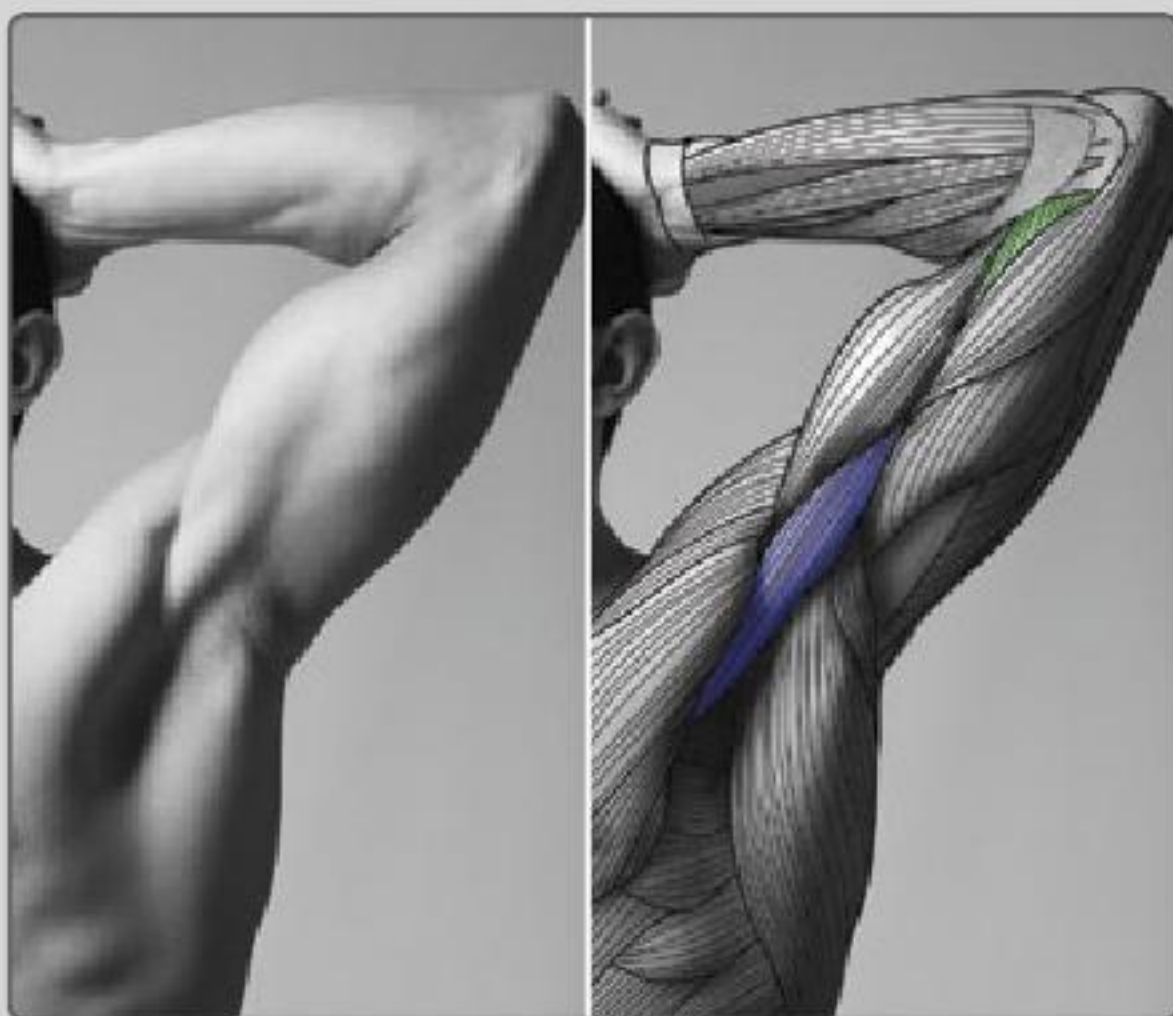
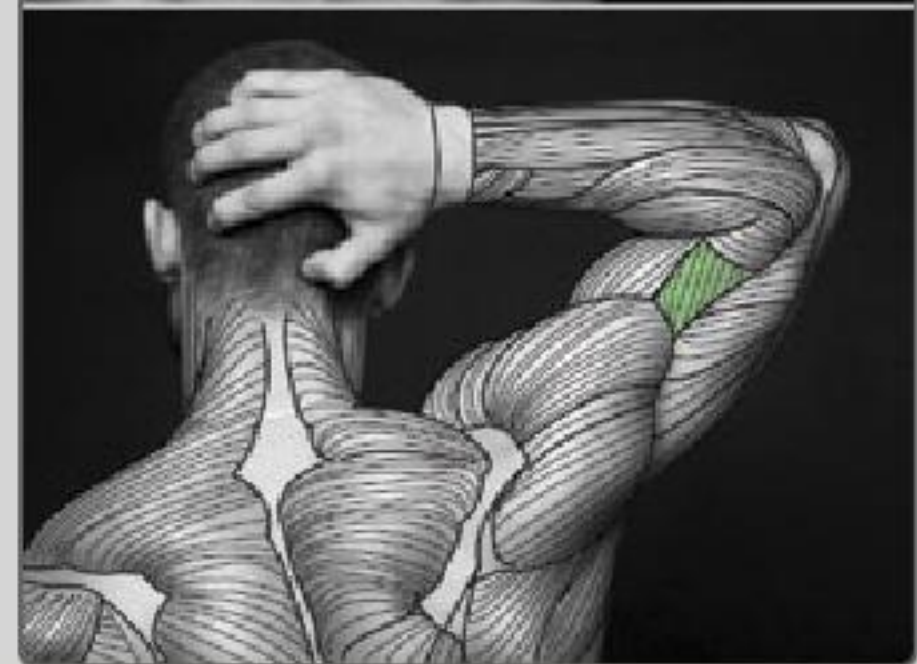
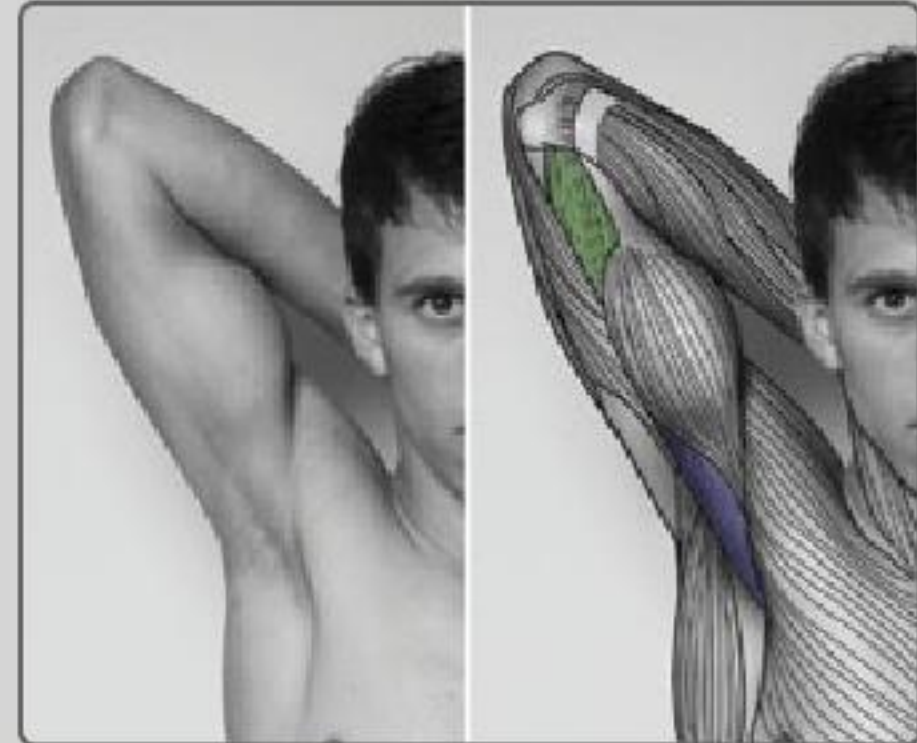
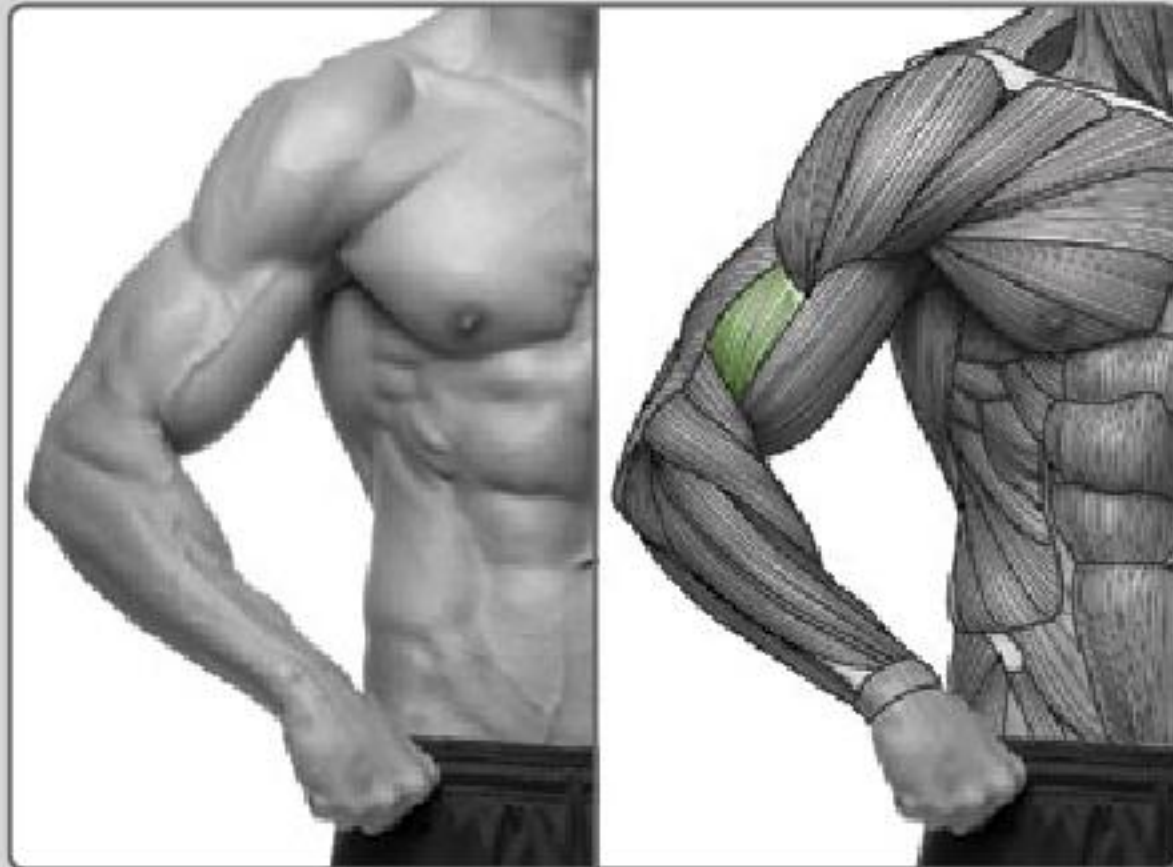
3 CORACOID PROCESS OF SCAPULA

#### INSERTION:

4 MEDIAL HUMERUS

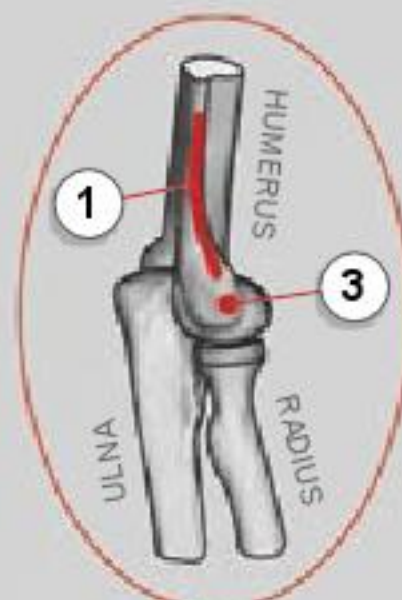
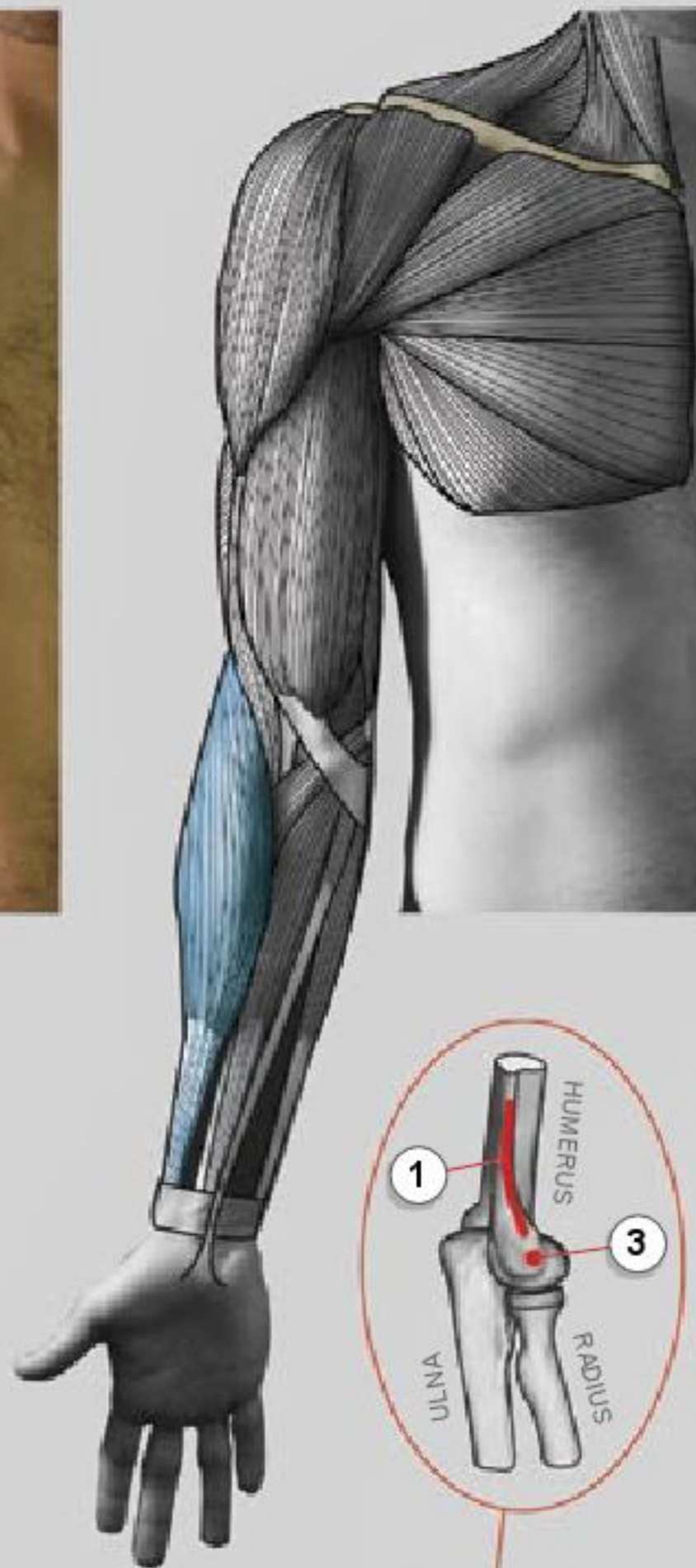


## BRACHIALIS AND CORACOBrachialis MUSCLES

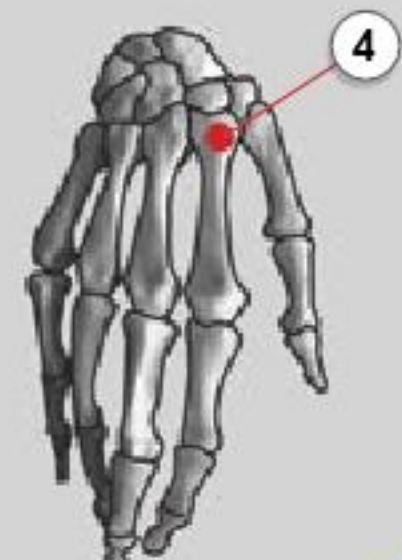




## BRACHIORADIALIS AND EXTENSOR CARPI RADIALIS LONGUS



BACK VIEW OF  
RIGHT HAND



i

### BRACHIORADIALIS

#### ACTION:

FLEXION OF ELBOW

#### ORIGIN:

1 LATERAL SUPRACONDYLAR  
RIDGE OF THE HUMERUS

#### INSERTION:

2 DISTAL RADIUS  
(RADIAL STYLOID PROCESS)

### EXTENSOR CARPI RADIALIS LONGUS

#### ACTION:

EXTENSOR AT THE WRIST JOINT,  
ABDUCTS THE HAND AT THE WRIST

#### ORIGIN:

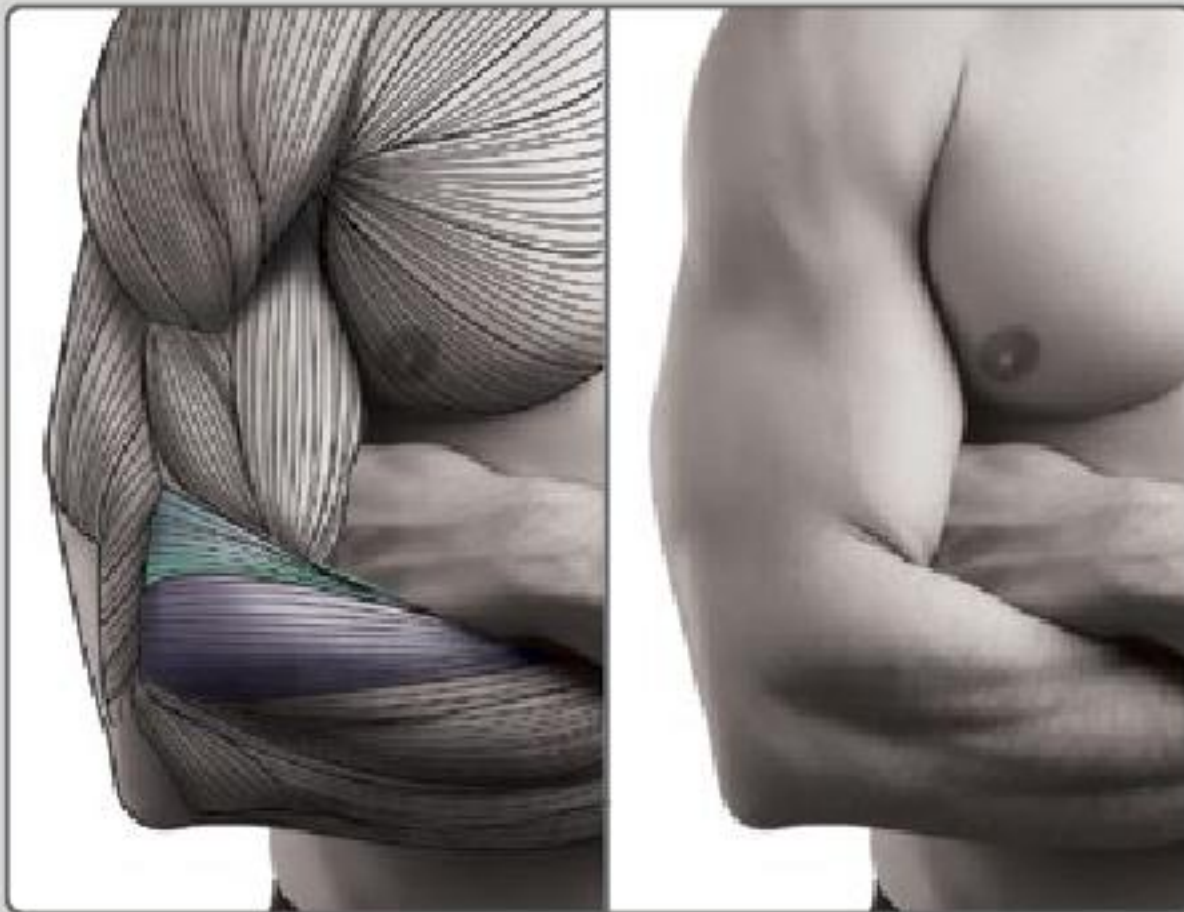
3 LATERAL SUPRACONDYLAR RIDGE

#### INSERTION:

4 2nd METACARPAL

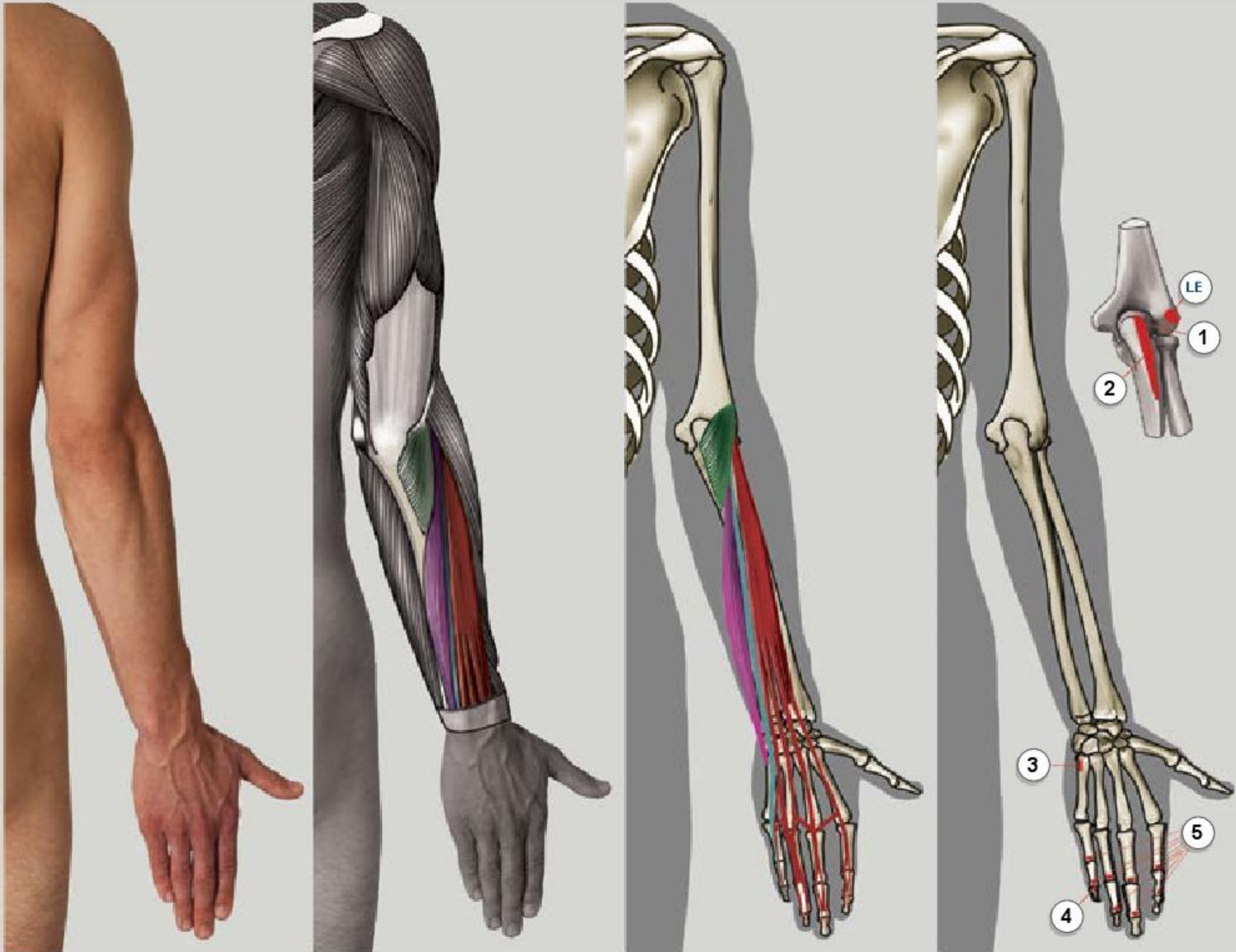


## BRACHIORADIALIS AND EXTENSOR CARPI RADIALIS LONGUS





# ANCONEUS, EXTENSOR CARPI ULNARIS, EXTENSOR DIGITI MINIMI AND EXTENSOR DIGITORUM MUSCLES



## ANCONEUS

### ACTION:

STABILIZES THE ELBOW

### ORIGIN:

**LE** LATERAL EPICONDYLE OF THE HUMERUS

### INSERTION:

- 1** LATERAL SURFACE OF THE OLECRANON PROCESS
- 2** SUPERIOR PART OF THE POSTERIOR ULNADISTALLY

## EXTENSOR CARPI ULNARIS

### ACTION:

EXTENDS AND ADDUCTS THE WRIST

### ORIGIN:

**LE** LATERAL EPICONDYLE OF THE HUMERUS, ULNA

### INSERTION:

- 3** 5th METACARPAL

## EXTENSOR DIGITI MINIMI

### ACTION:

EXTENDS THE WRIST AND THE LITTLE FINGER AT ALL JOINTS

### ORIGIN:

**LE** LATERAL EPICONDYLE OF THE HUMERUS

### INSERTION:

- 4** AT THE EXTENSOR EXPANSION ON PROXIMAL PHALANX OF THE LITTLE FINGER

## EXTENSOR DIGITORUM

### ACTION:

EXTENDS HAND, WRIST AND FINGERS

### ORIGIN:

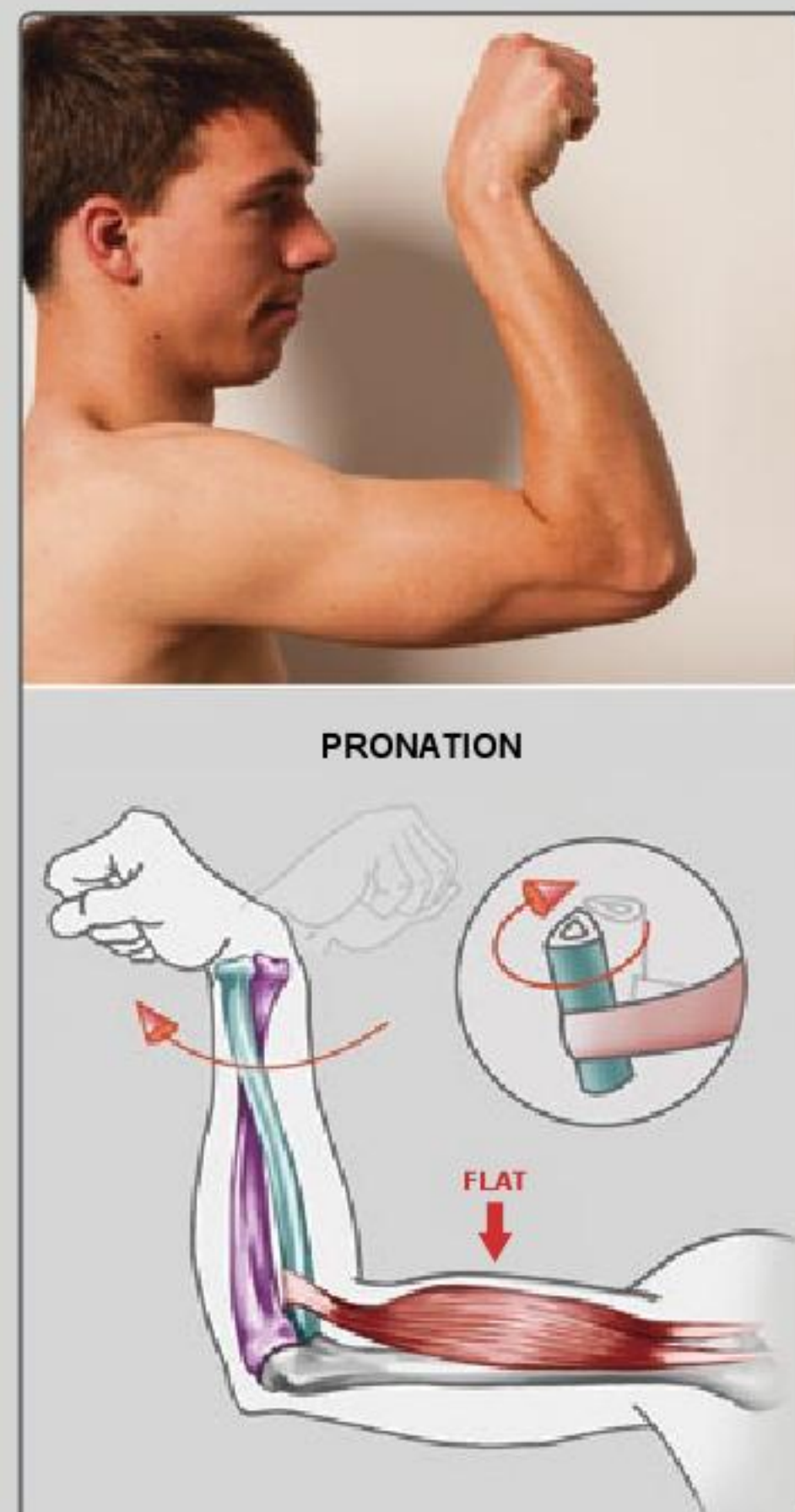
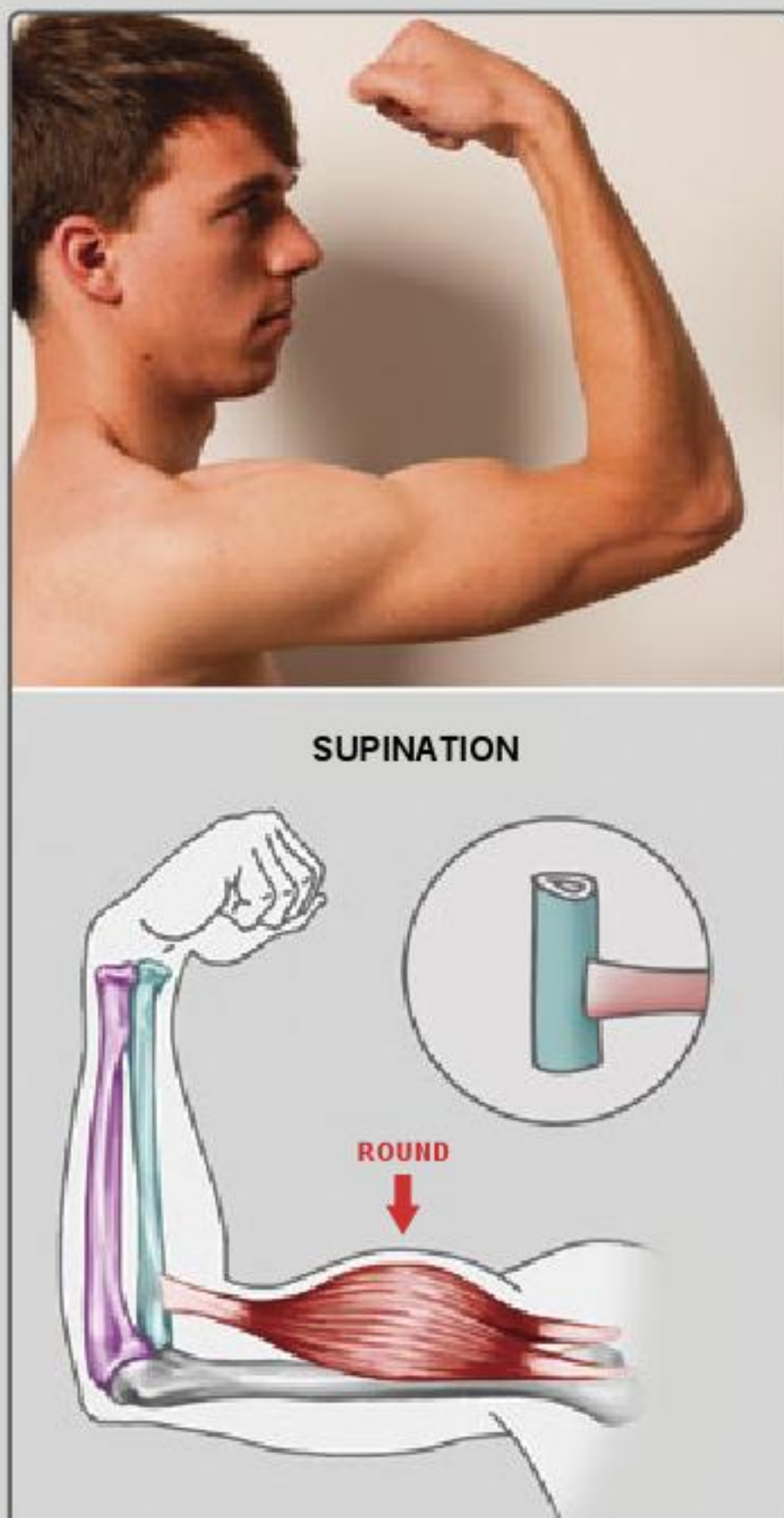
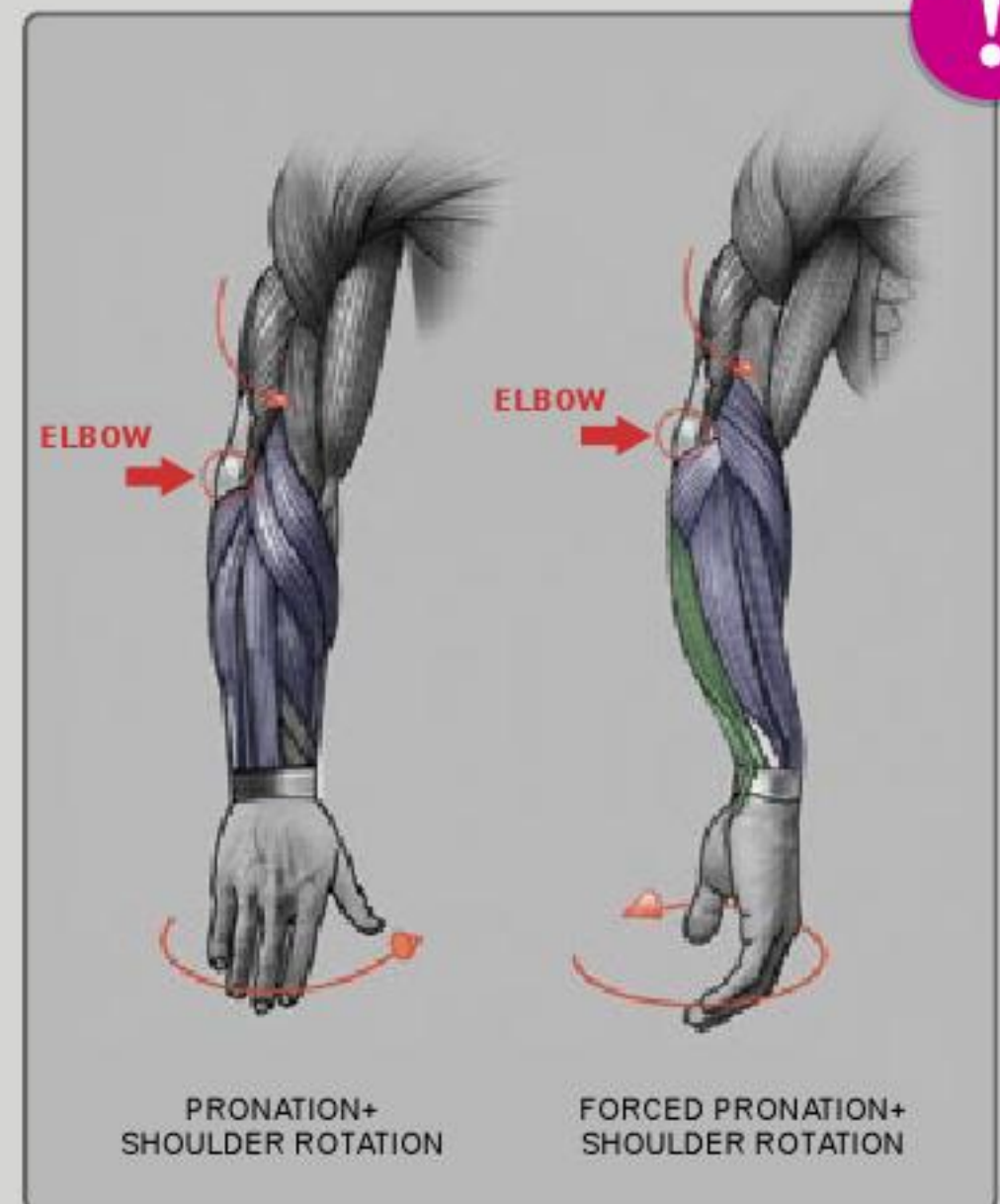
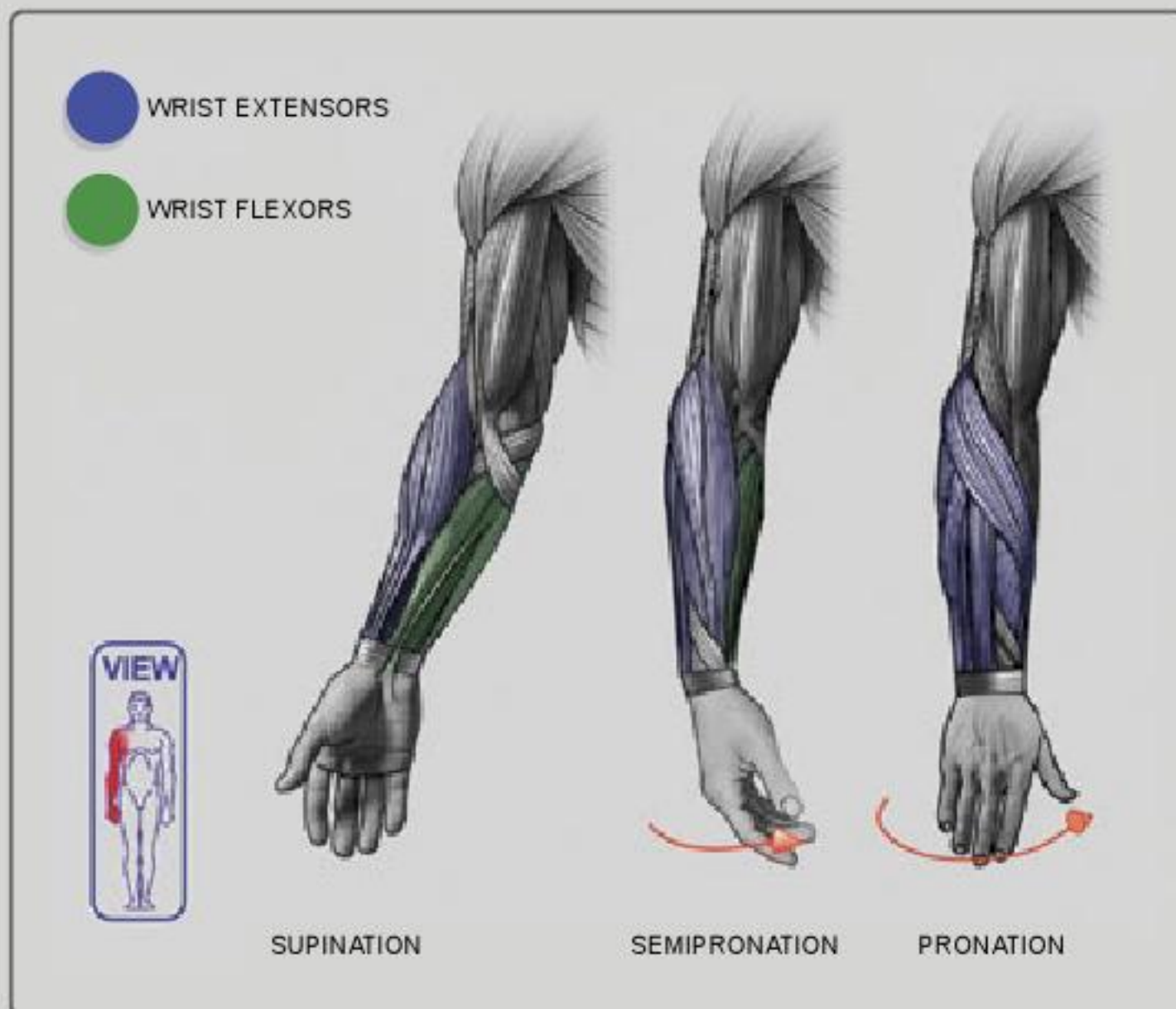
**LE** LATERAL EPICONDYLE OF THE HUMERUS

### INSERTION:

- 5** EXTENSOR EXPANSION OF MIDDLE AND DISTAL PHALANGES OF THE 2nd, 3rd, 4th AND 5th FINGERS

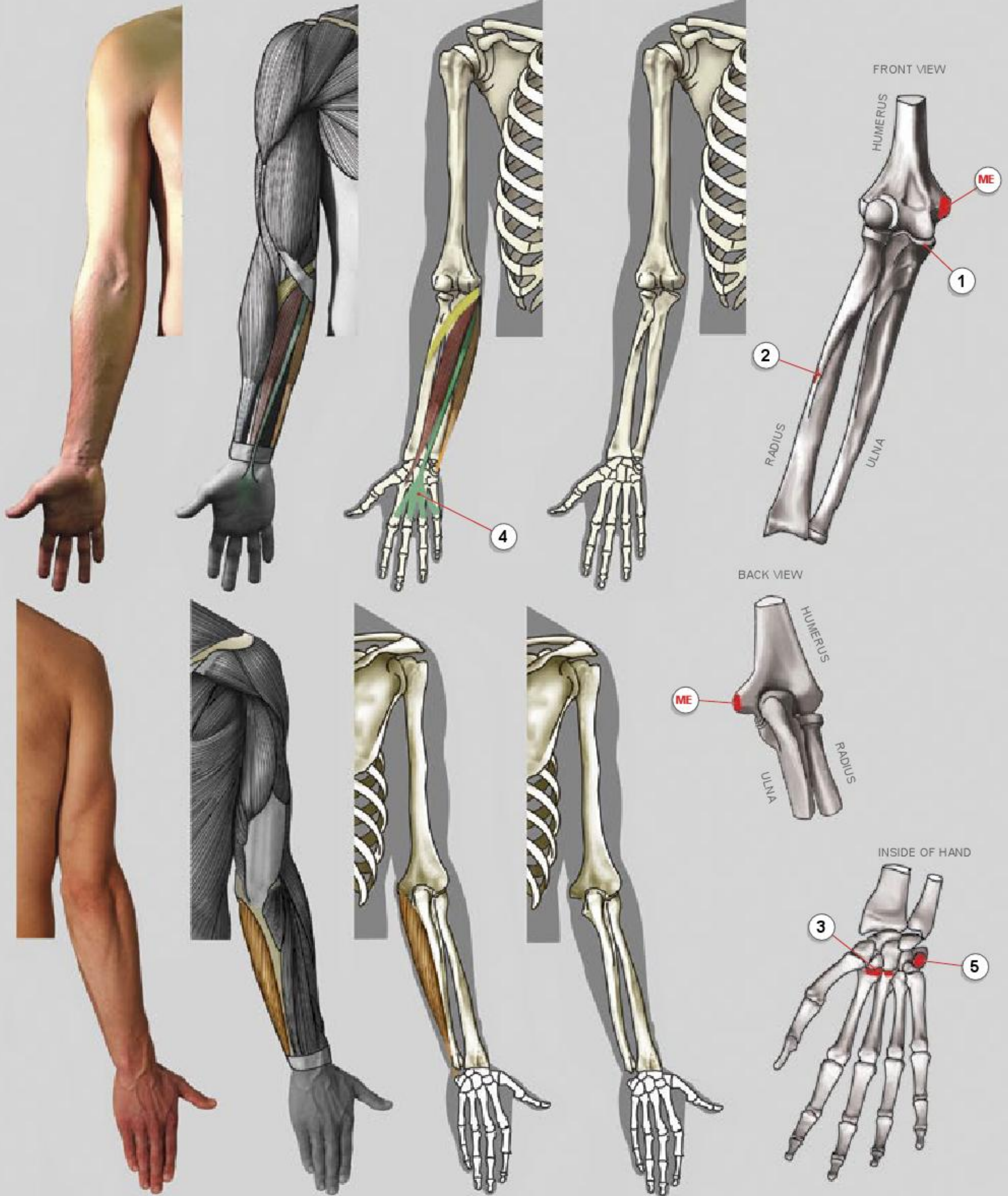


## SUPINATION AND PRONATION





## FLEXOR MUSCLES

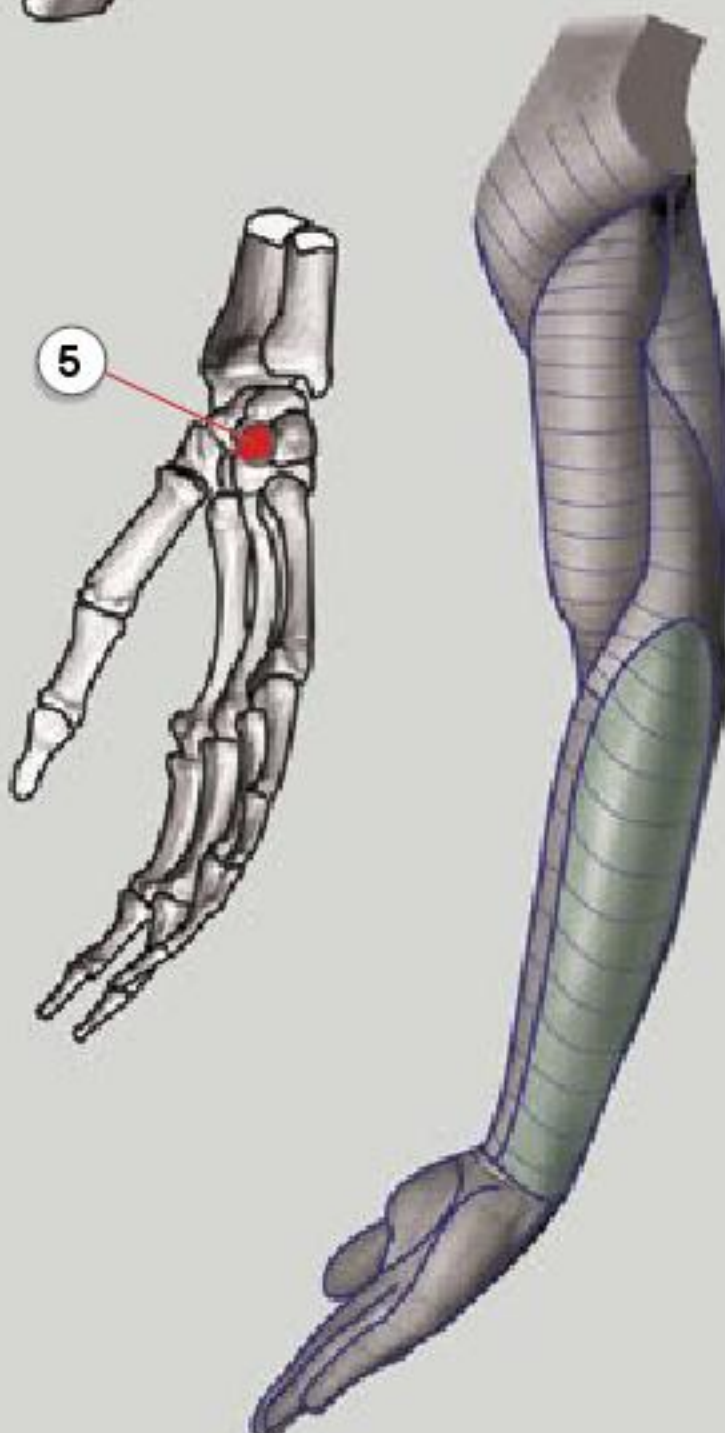
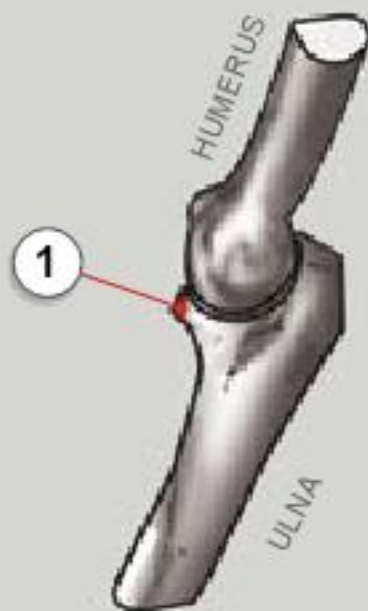
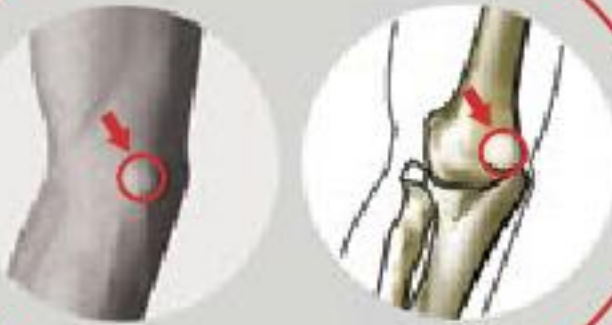




## FLEXOR MUSCLES (FROM INNER SIDE)



ALL FLEXORS ARISE FROM THE **MEDIAL EPICONDYLE OF THE HUMERUS** (ME).



### PRONATOR TERES

#### ACTION:

PRONATION OF FOREARM, FLEXES ELBOW

#### ORIGIN:

- ME** MEDIAL EPICONDYLE OF HUMERUS (COMMON FLEXOR TENDON)
- 1** ULNAR HEAD: CORONOID PROCESS OF ULNA

#### INSERTION:

- 2** MIDDLE OF THE LATERAL SURFACE OF THE RADIUS

### FLEXOR CARPI RADIALIS

#### ACTION:

FLEXION AND ABDUCTION AT WRIST

#### ORIGIN:

- ME** MEDIAL EPICONDYLE OF HUMERUS (COMMON FLEXOR TENDON)

#### INSERTION:

- 3** BASE OF SECOND AND THIRD METACARPAL BONES

### PALMARIS LONGUS

#### ACTION:

WRIST FLEXOR

#### ORIGIN:

- ME** MEDIAL EPICONDYLE OF HUMERUS (COMMON FLEXOR TENDON)

#### INSERTION:

- 4** PALMAR APONEUROSIS

### FLEXOR CARPI ULNARIS

#### ACTION:

FLEXION AND ABDUCTION AT WRIST

#### ORIGIN:

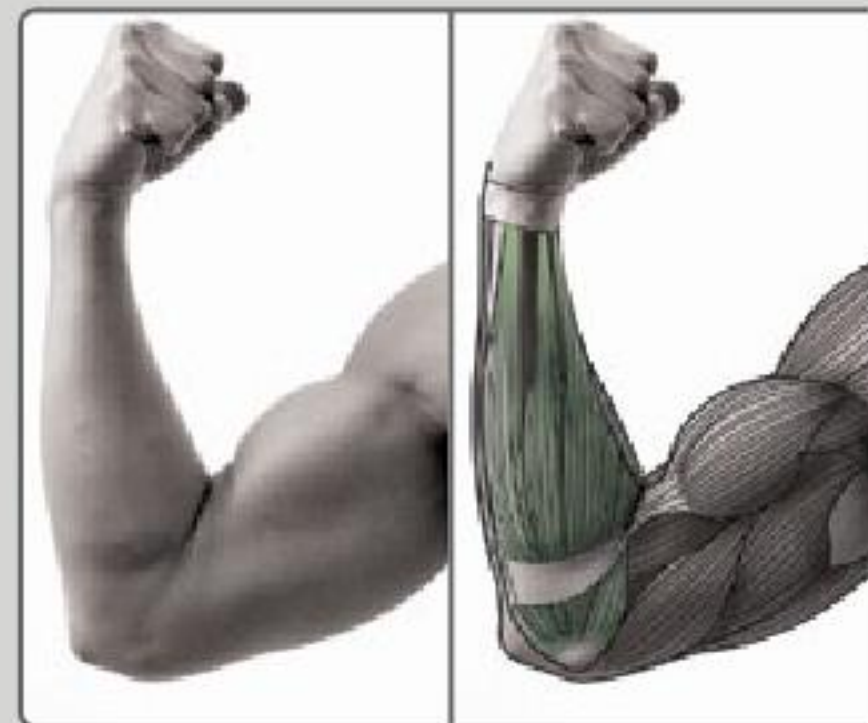
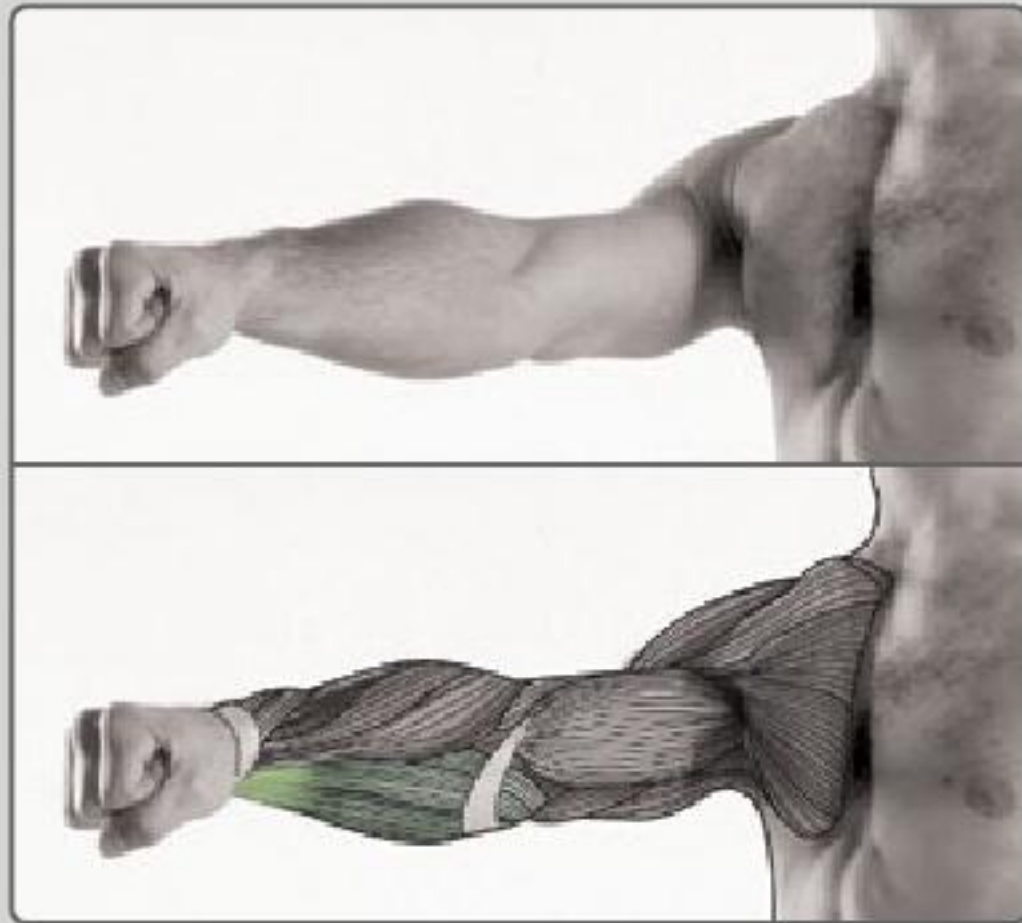
- ME** MEDIAL EPICONDYLE OF HUMERUS (COMMON FLEXOR TENDON)

#### INSERTION:

- 5** PISIFORM

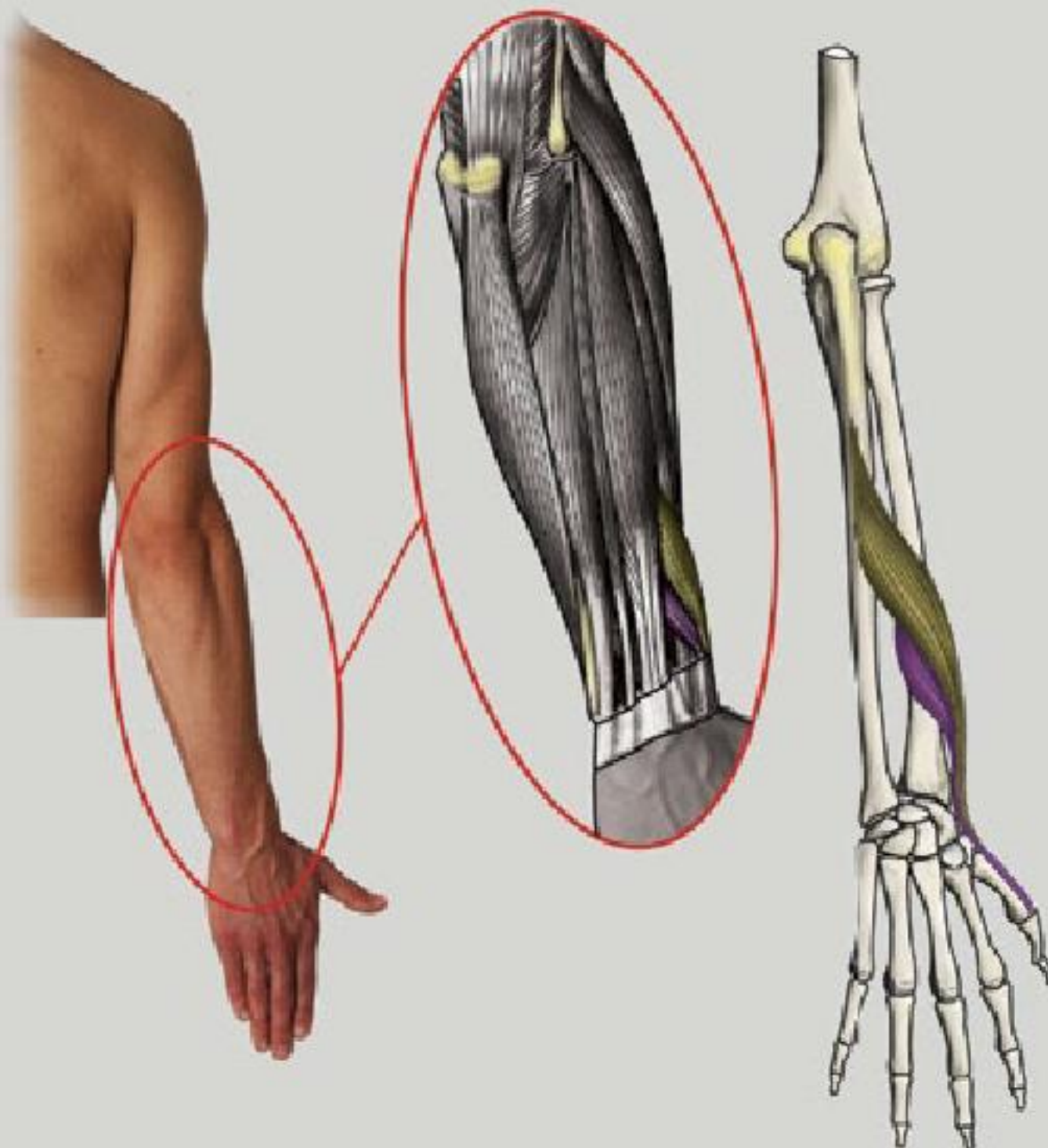
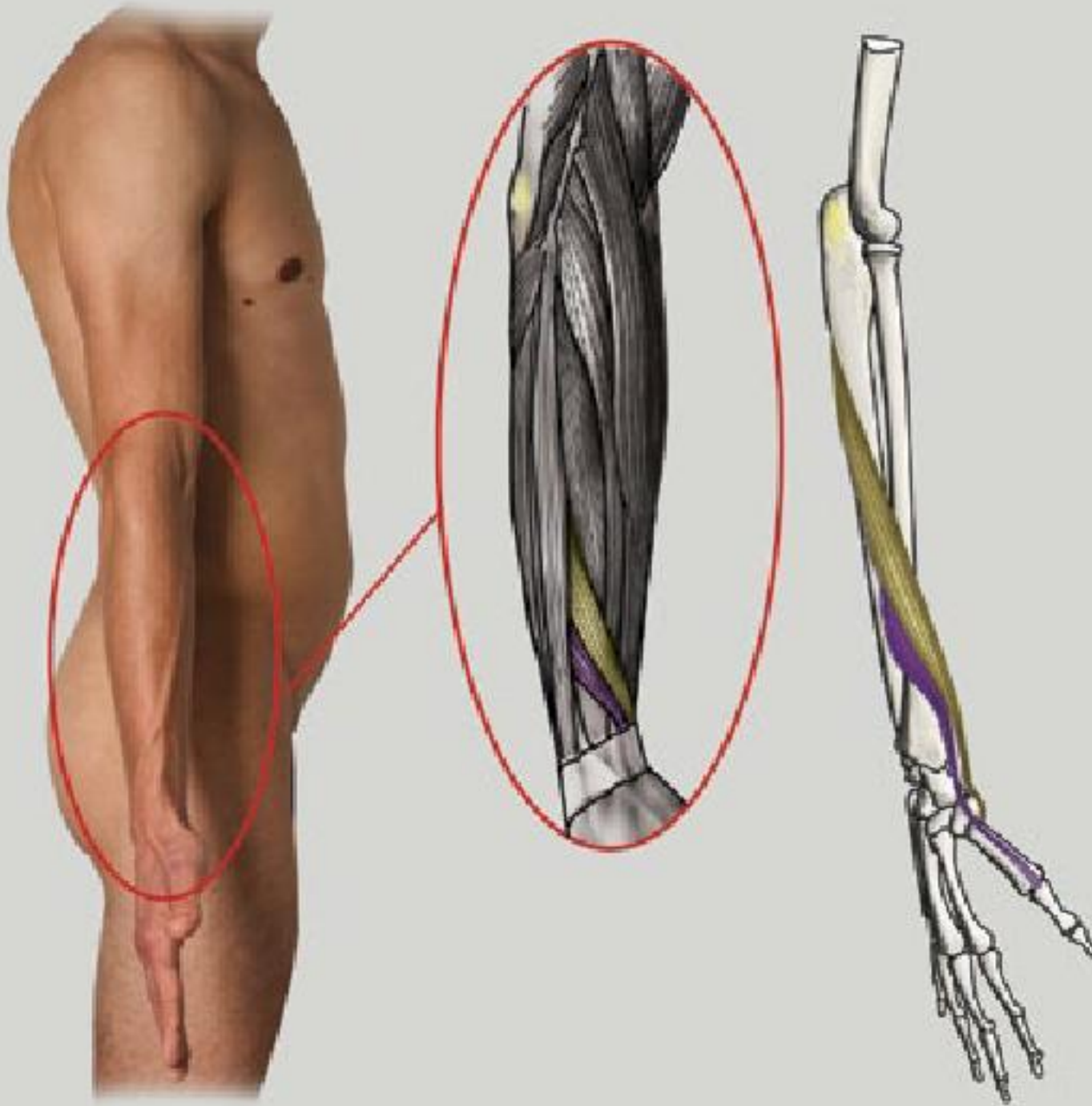


## FLEXOR MUSCLES





## ABDUCTOR POLLICIS LONGUS AND EXTENSOR POLLICIS BREVIS MUSCLES



### ABDUCTOR POLLICIS LONGUS

#### ACTION:

ABDUCTION, EXTENSION OF THUMB

#### ORIGIN:

ULNA, RADIUS,  
INTEROSSEOUS MEMBRANE

#### INSERTION:

FIRST METACARPAL

### EXTENSOR POLLICIS BREVIS

#### ACTION:

EXTENSION OF THUMB AT  
METACARPOPHALANGEAL JOINT

#### ORIGIN:

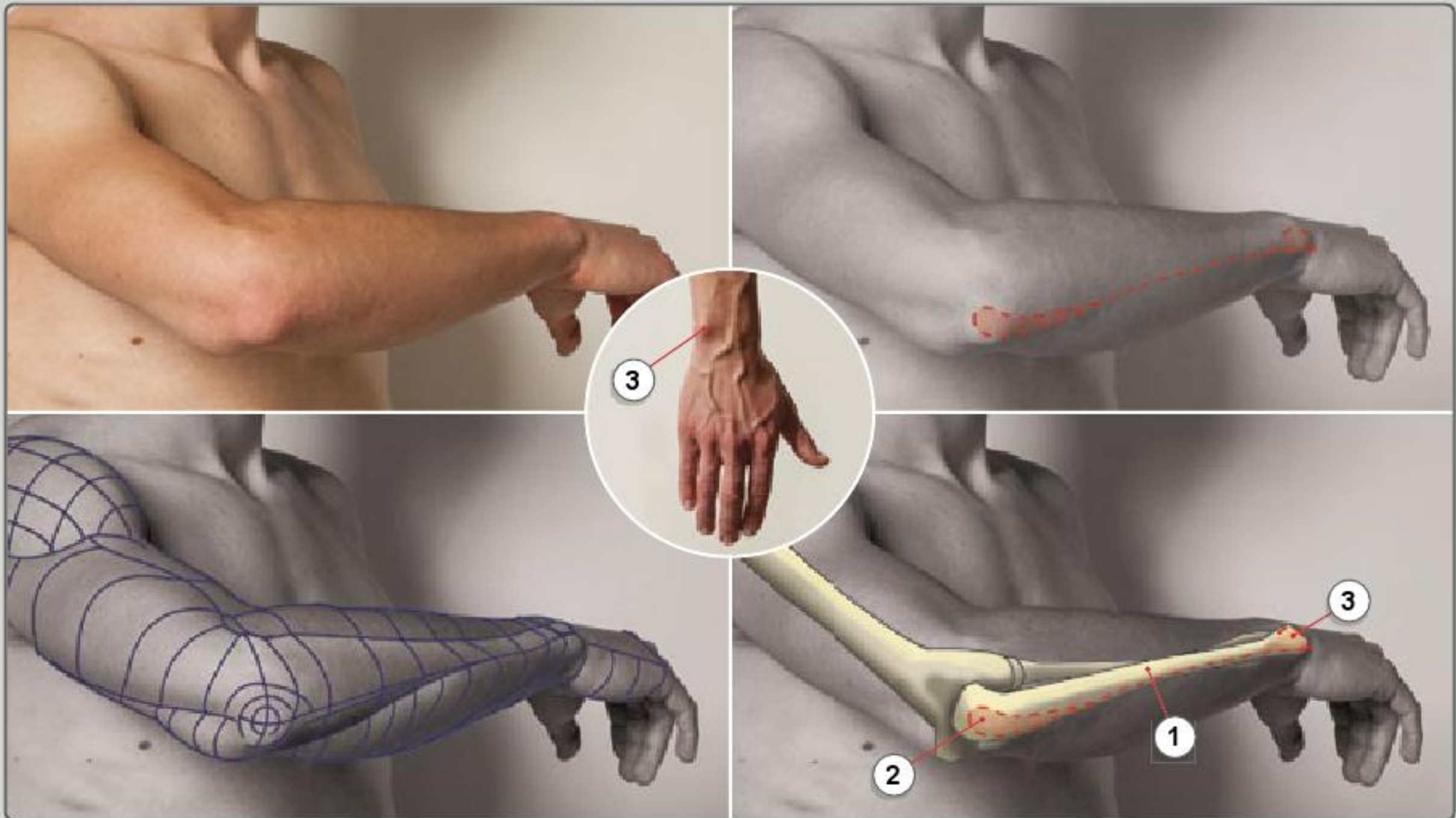
RADIUS AND THE INTEROSSEOUS MEMBRANE

#### INSERTION:

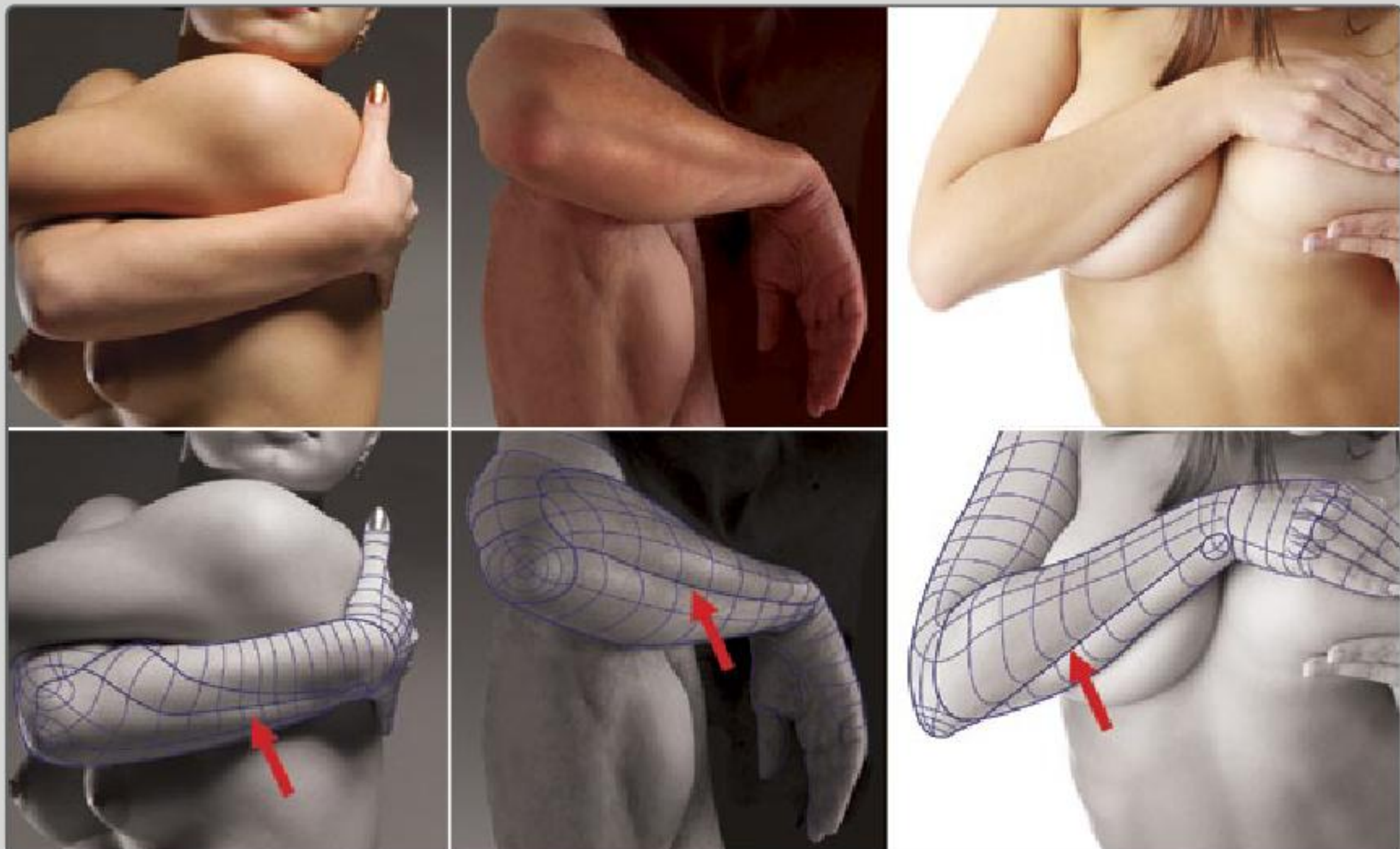
THUMB, PROXIMAL PHALANX



## THE BODY OF THE ULNA

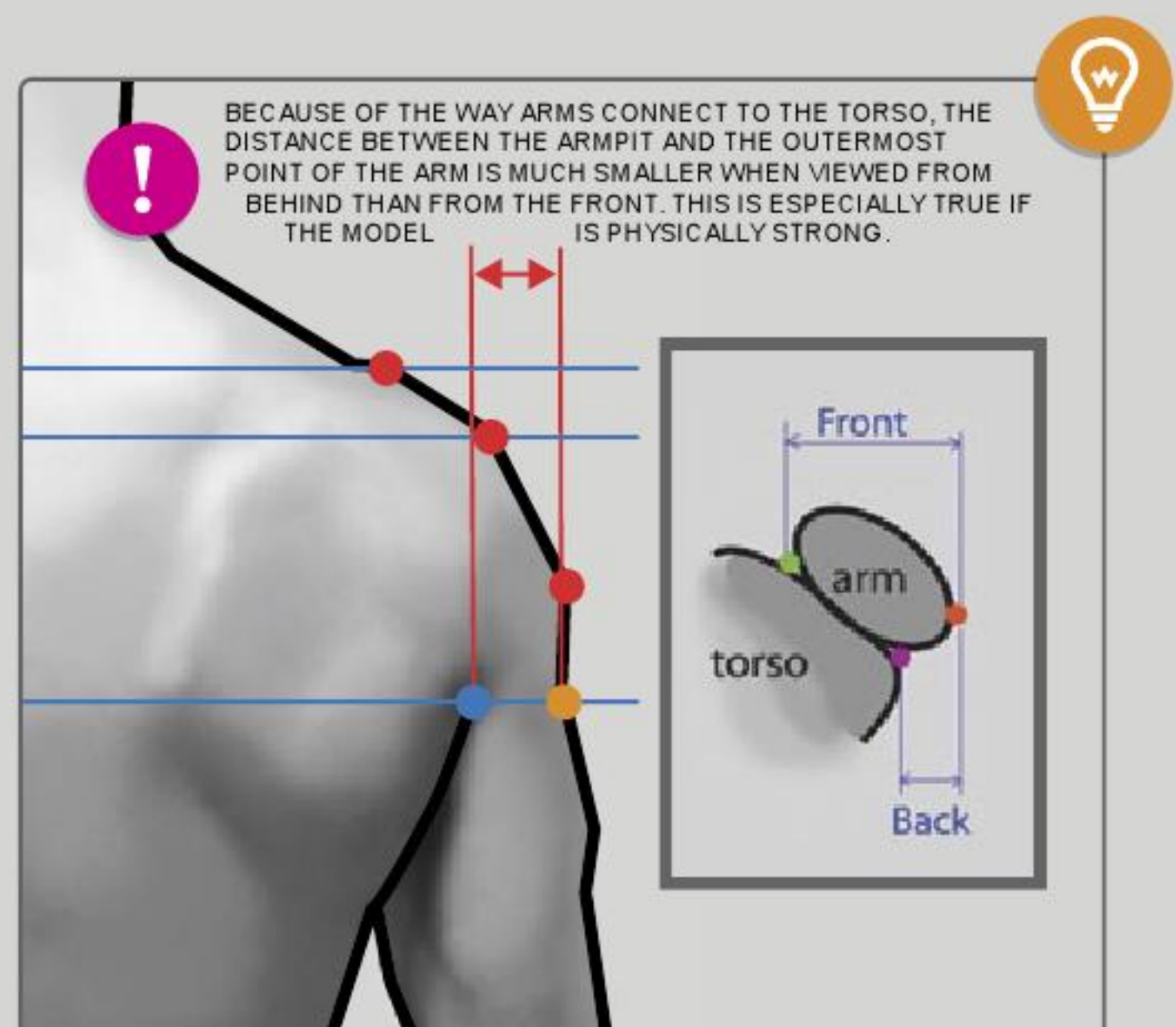
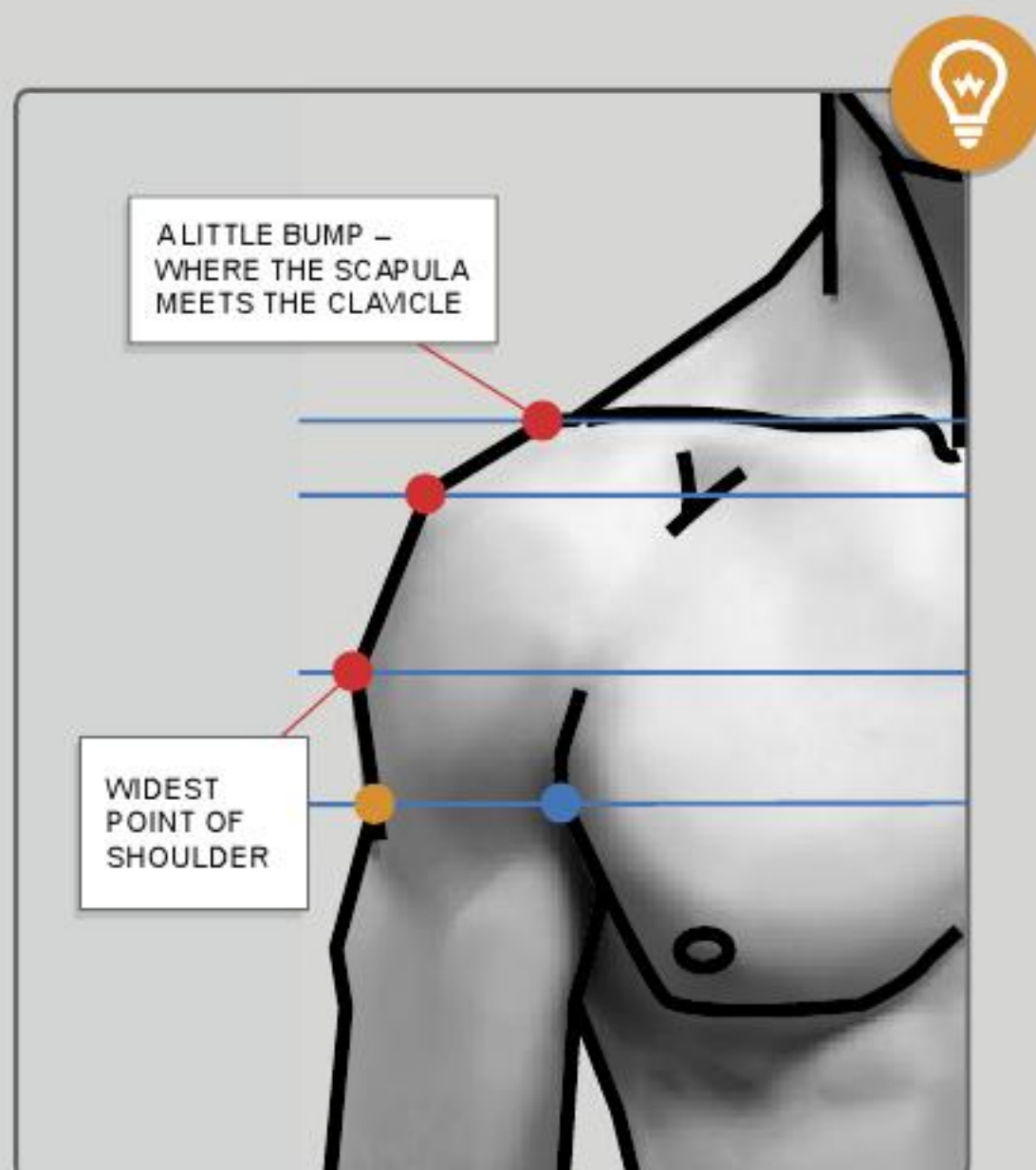
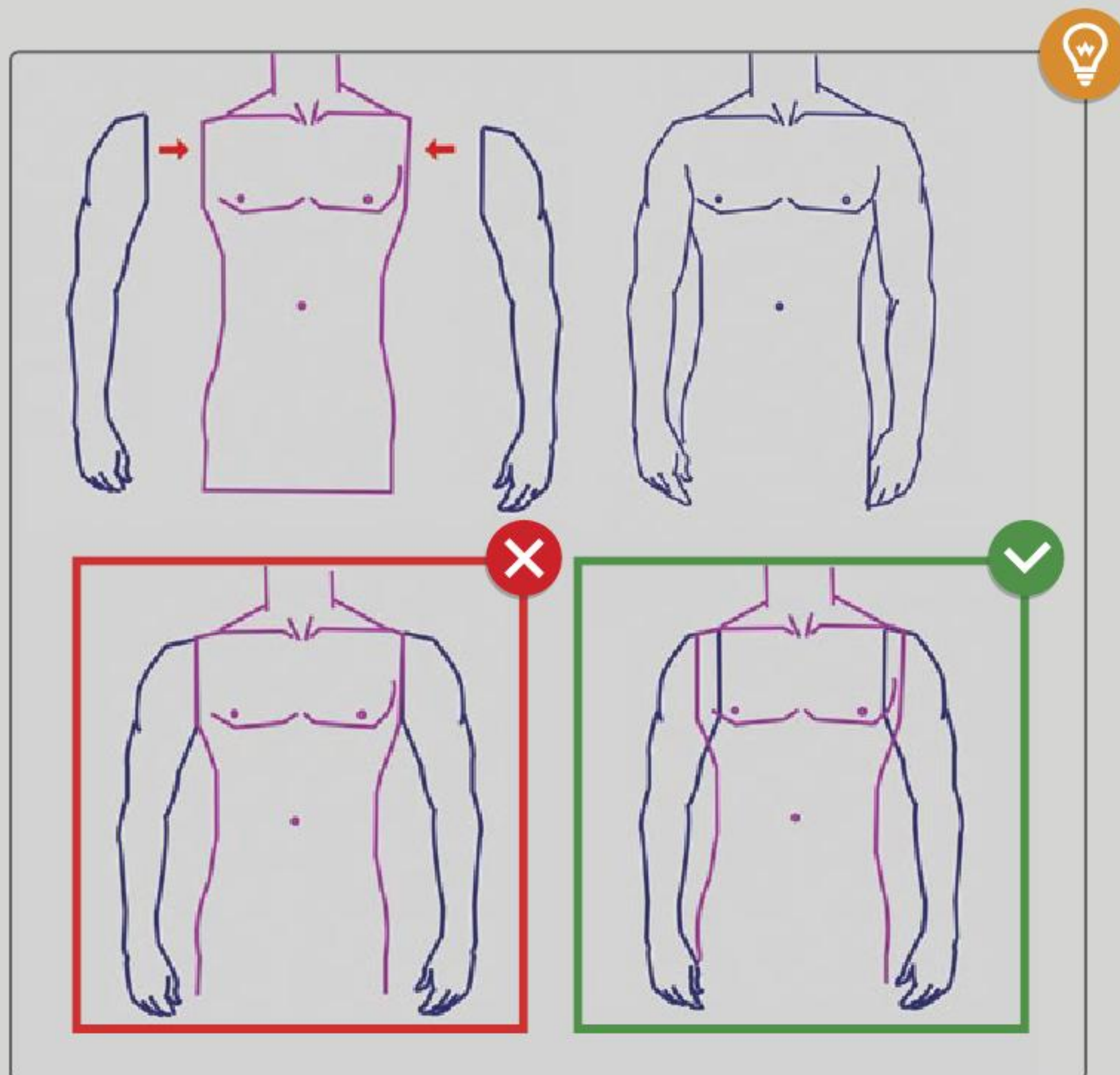


THE BODY OF **THE ULNA** ① IS AN IMPORTANT LANDMARK. WHEREVER YOU TURN THE HAND, THE ULNA ALWAYS EXTENDS FROM **THE ELBOW** ② TO LITTLE FINGER SIDE OF THE HAND, WHERE IT IS VISIBLE AS **A BUMP** ③ IT IS ALWAYS VISIBLE AS A RIDGE OR FURROW. BOTH ENDS OF THE BONE ARE NOT COVERED BY MUSCLES, ONLY BY THIN LAYER OF SKIN.





## HOW ARMS CONNECT TO THE BODY

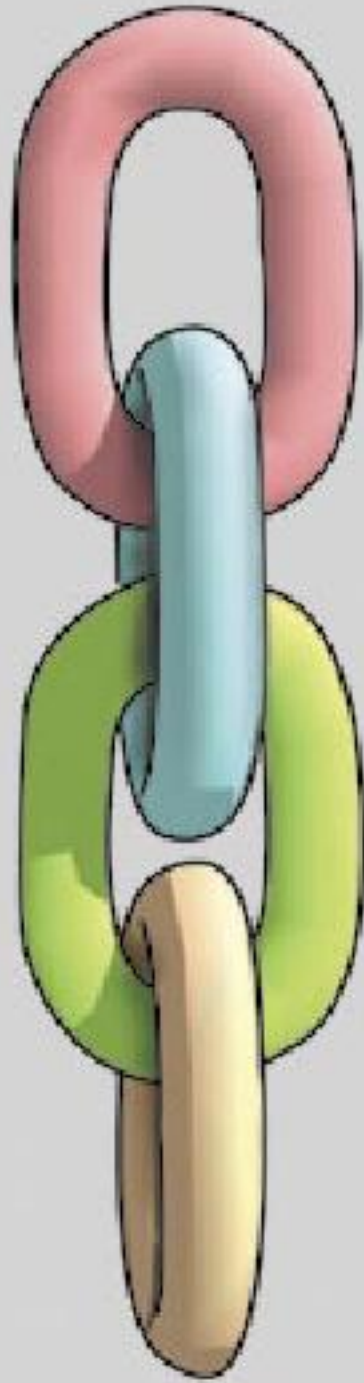




## BLOCKING OUT A SEMIPRONATED ARM

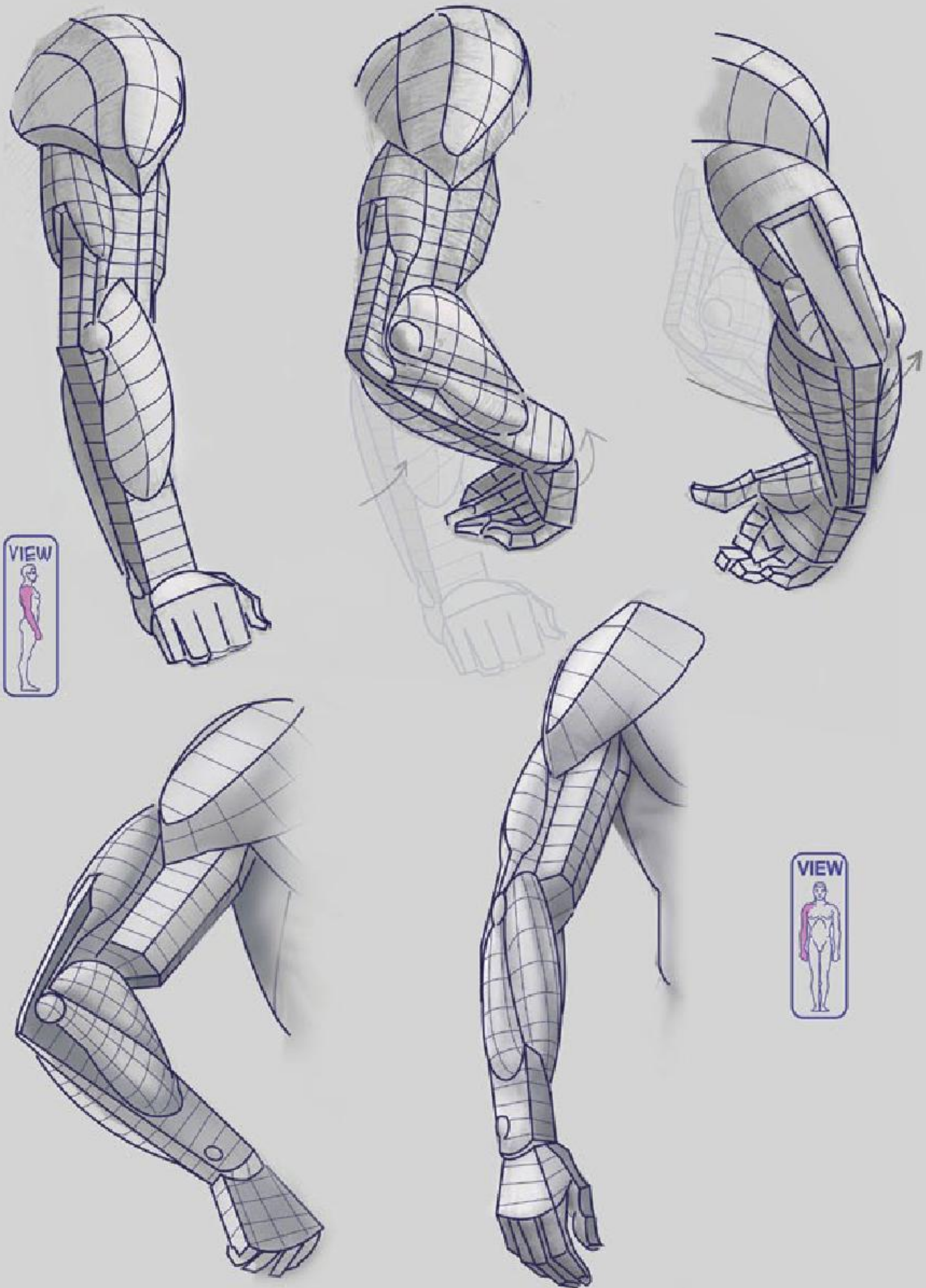


JUST LIKE A CHAIN



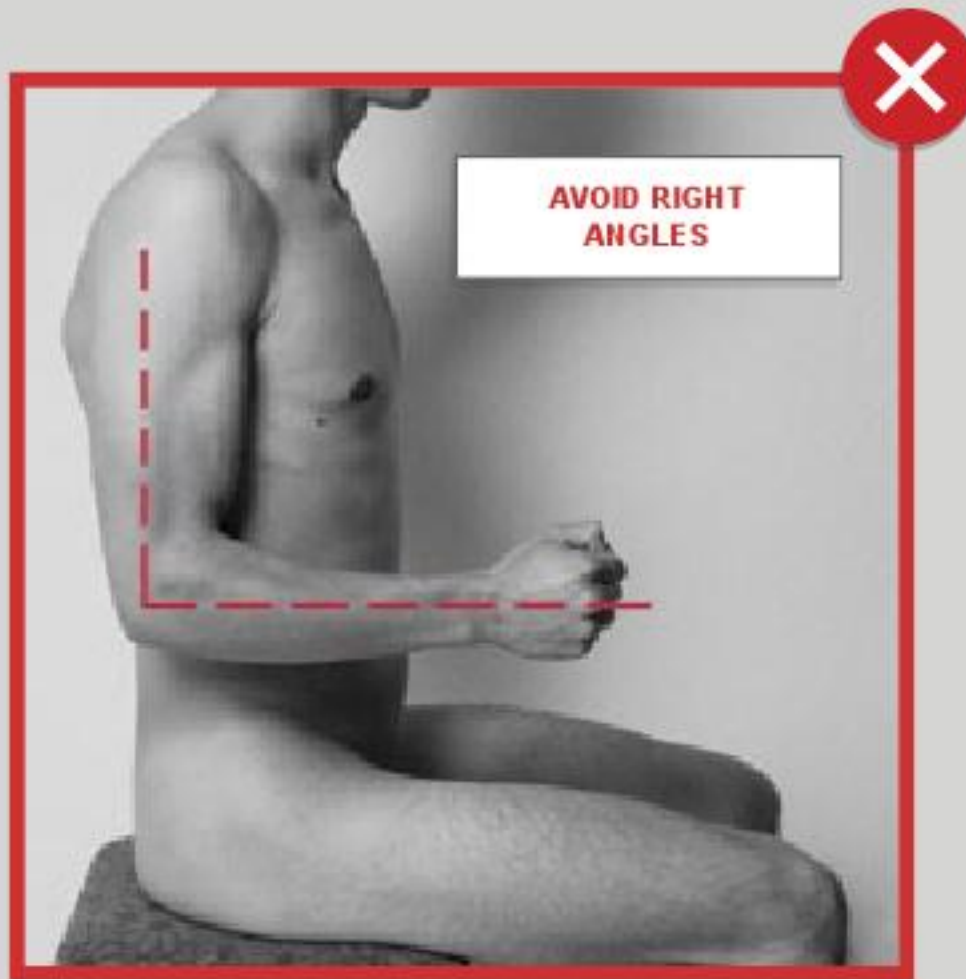


## BLOCKING OUT AN ARM

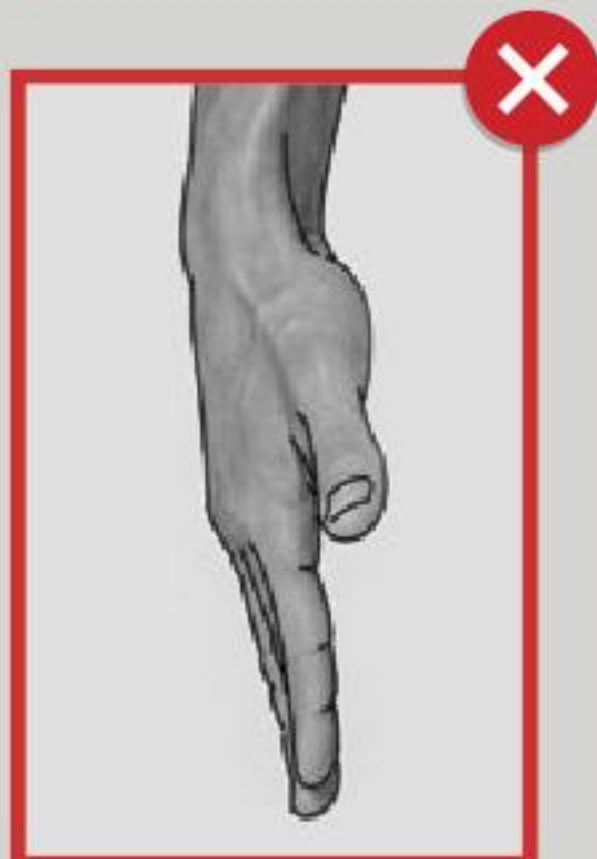
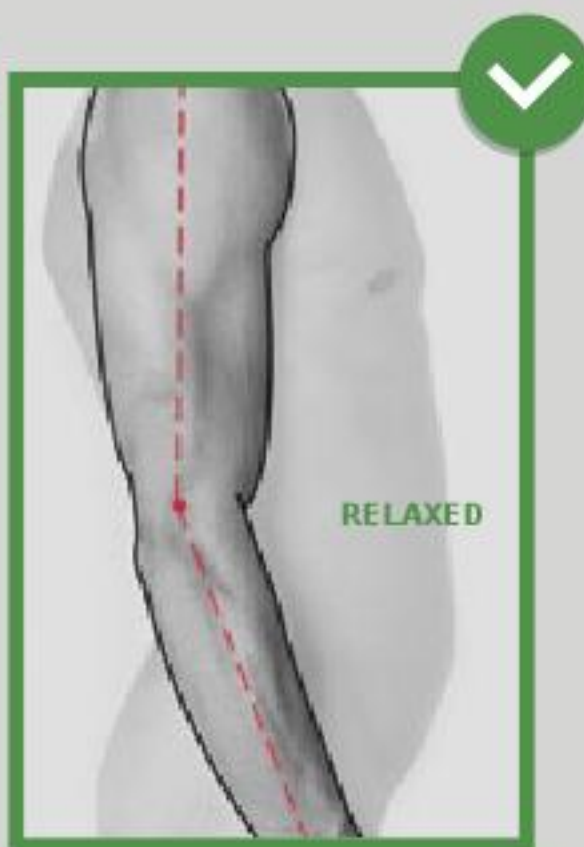
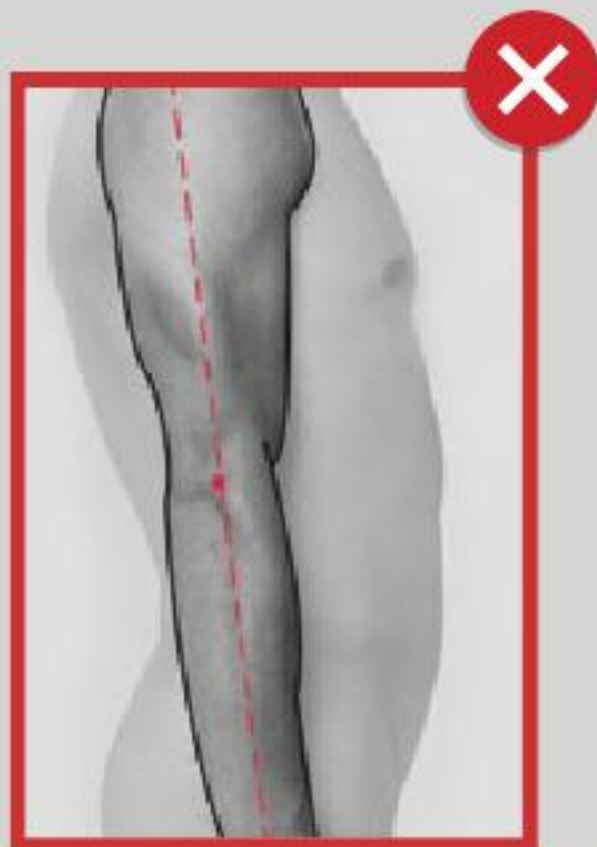




## HOW DO YOU MAKE ARMS AND HANDS LOOK LESS STIFF?

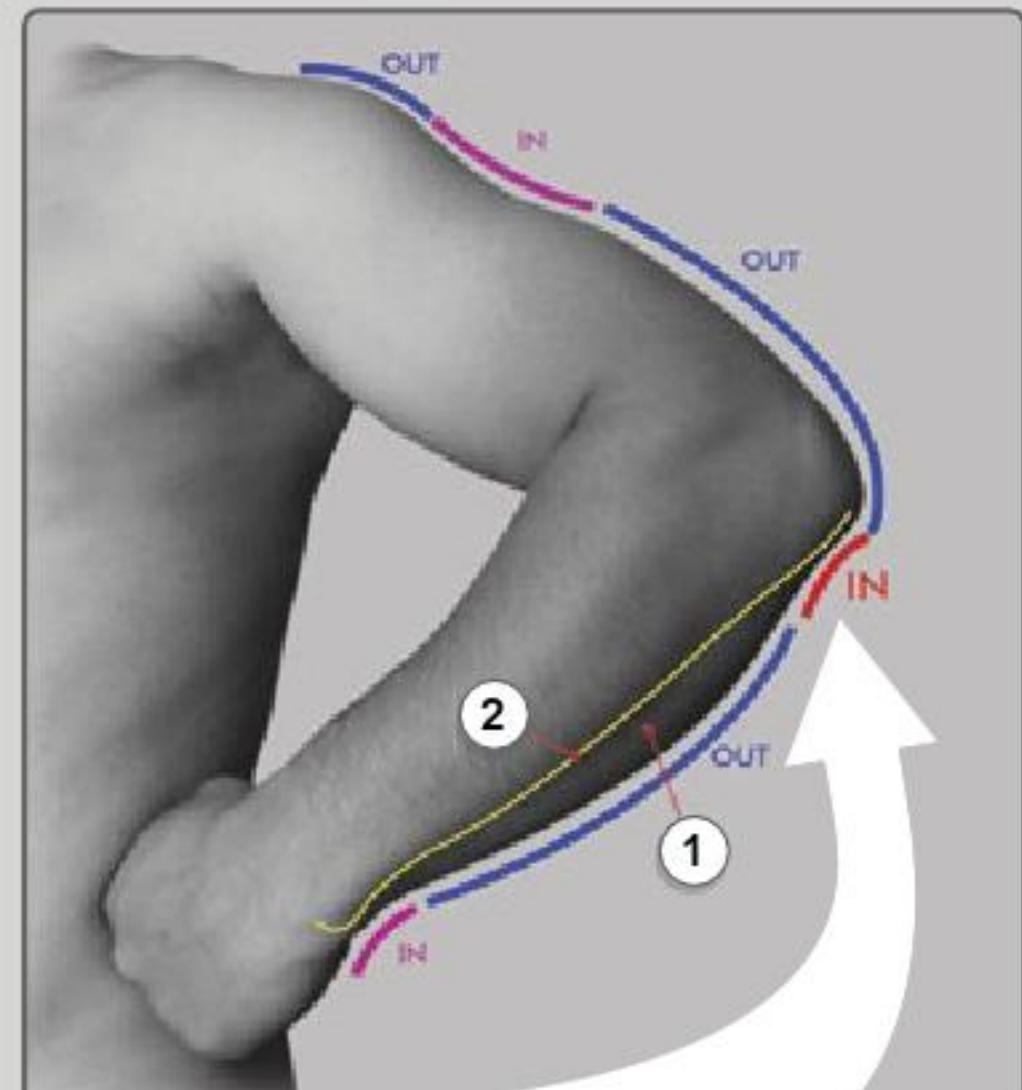
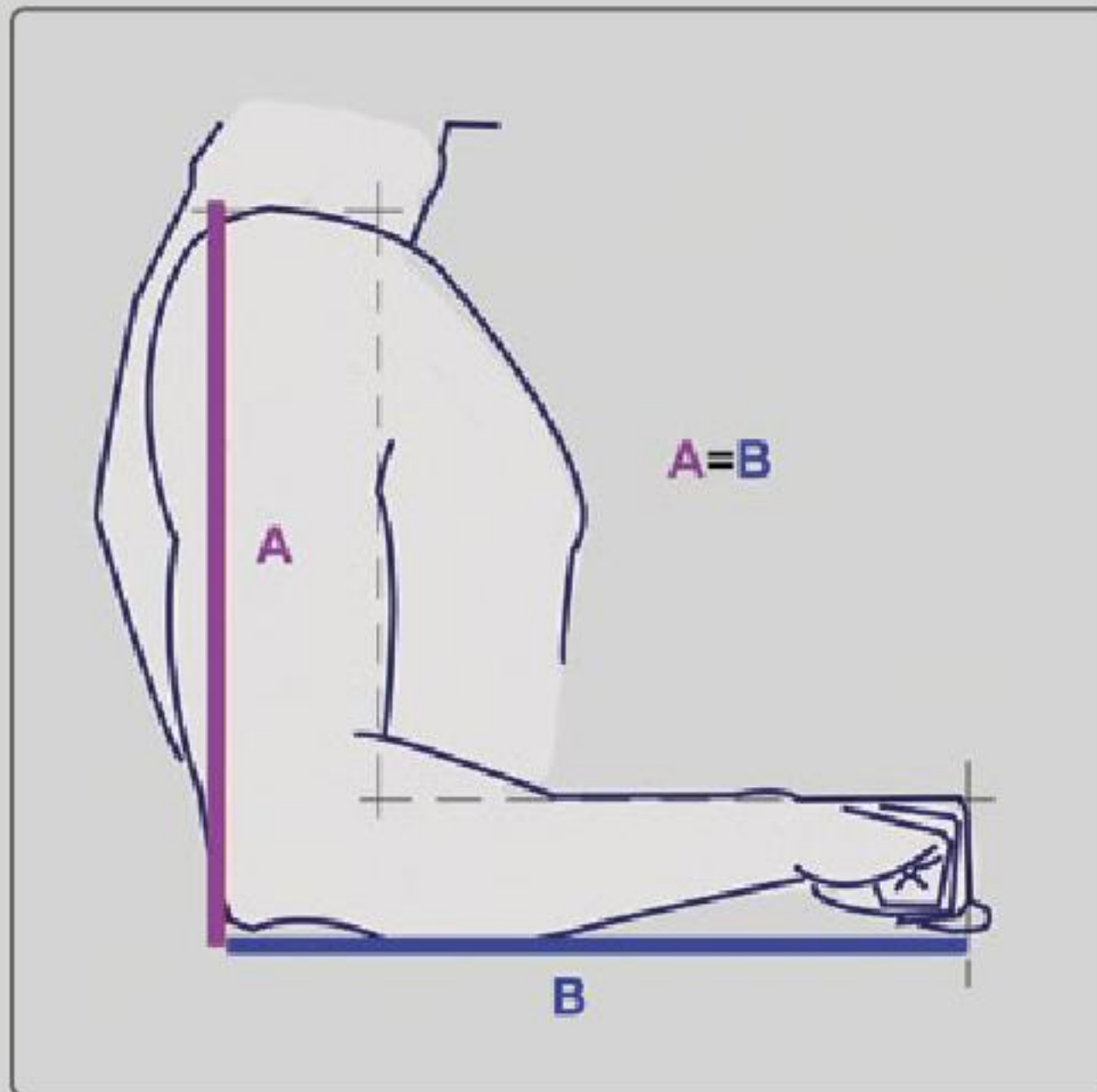


DON'T MAKE ARMS OR HANDS STRAIGHT WITHOUT SPECIAL REASON.



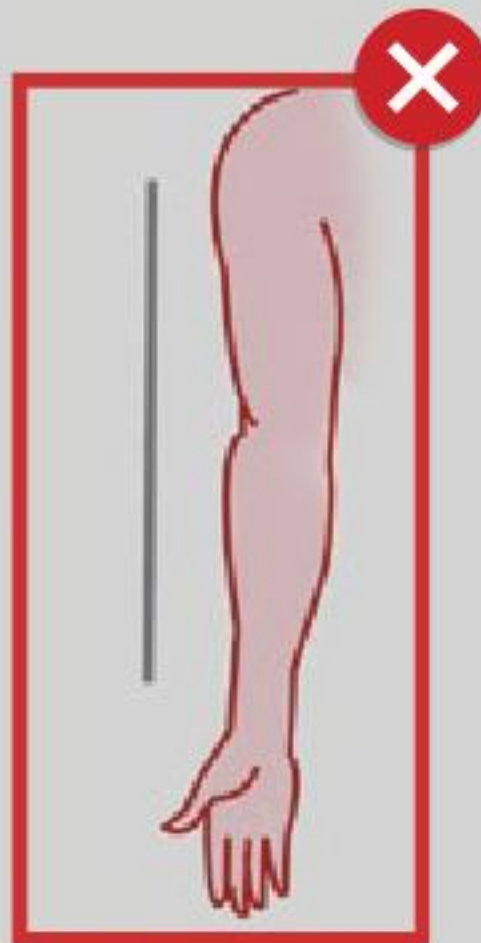


## HANDY TIPS



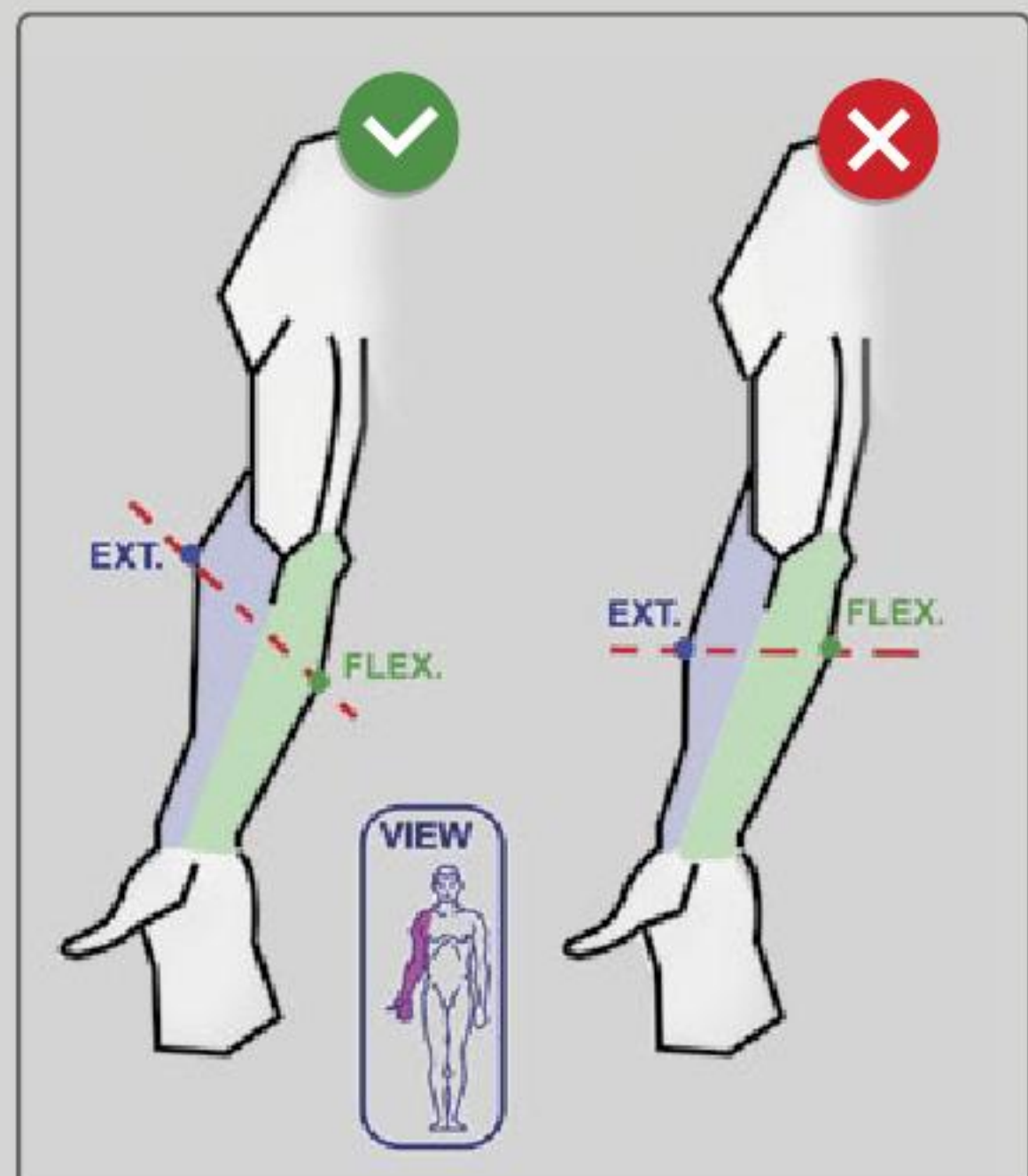
BODY SILHOUETTE APPEARS TO BEND **INWARD** RIGHT BELOW THE ELBOW DUE TO THE FLEXOR CARPI ULNARIS MUSCLE ① POPPING **OUTWARD**.

ULNA BONE ② REMAINS STRAIGHT.



WHEN ARMS ARE HELD OUT AT THE SIDES WITH PALMS FACING FORWARD (SUPINATION), FOREARM AND HAND ARE ABOUT 5 TO 15 DEGREES AWAY FROM THE BODY. THIS IS CALLED "THE CARRYING ANGLE".

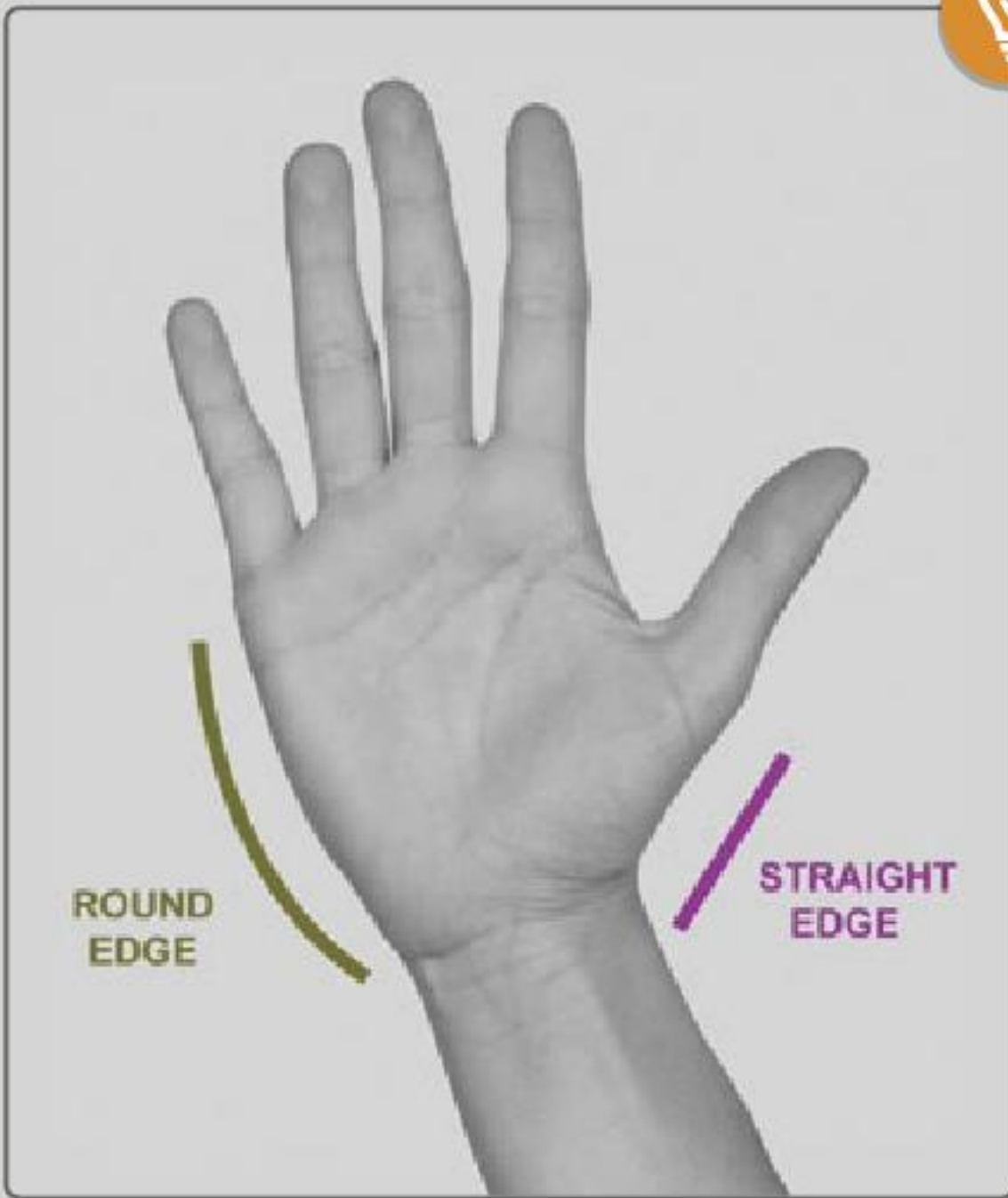
FEMALE ARMS HAVE A GREATER **C.A.**



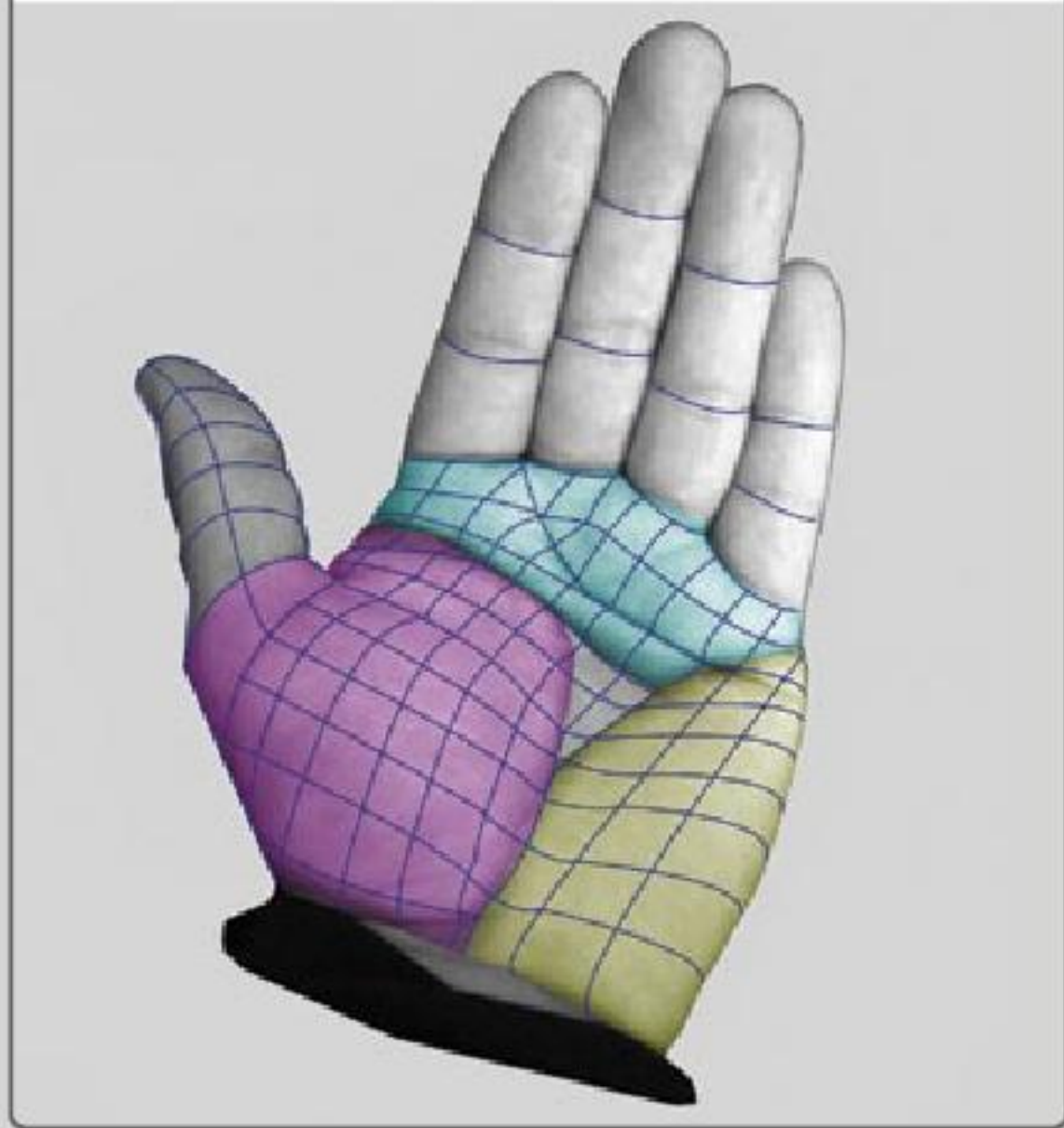
THE HIGHEST POINT OF **THE EXTENSOR MUSCLES** IS LOCATED HIGHER THAN THE TOP POINT OF **THE FLEXOR MUSCLES**.



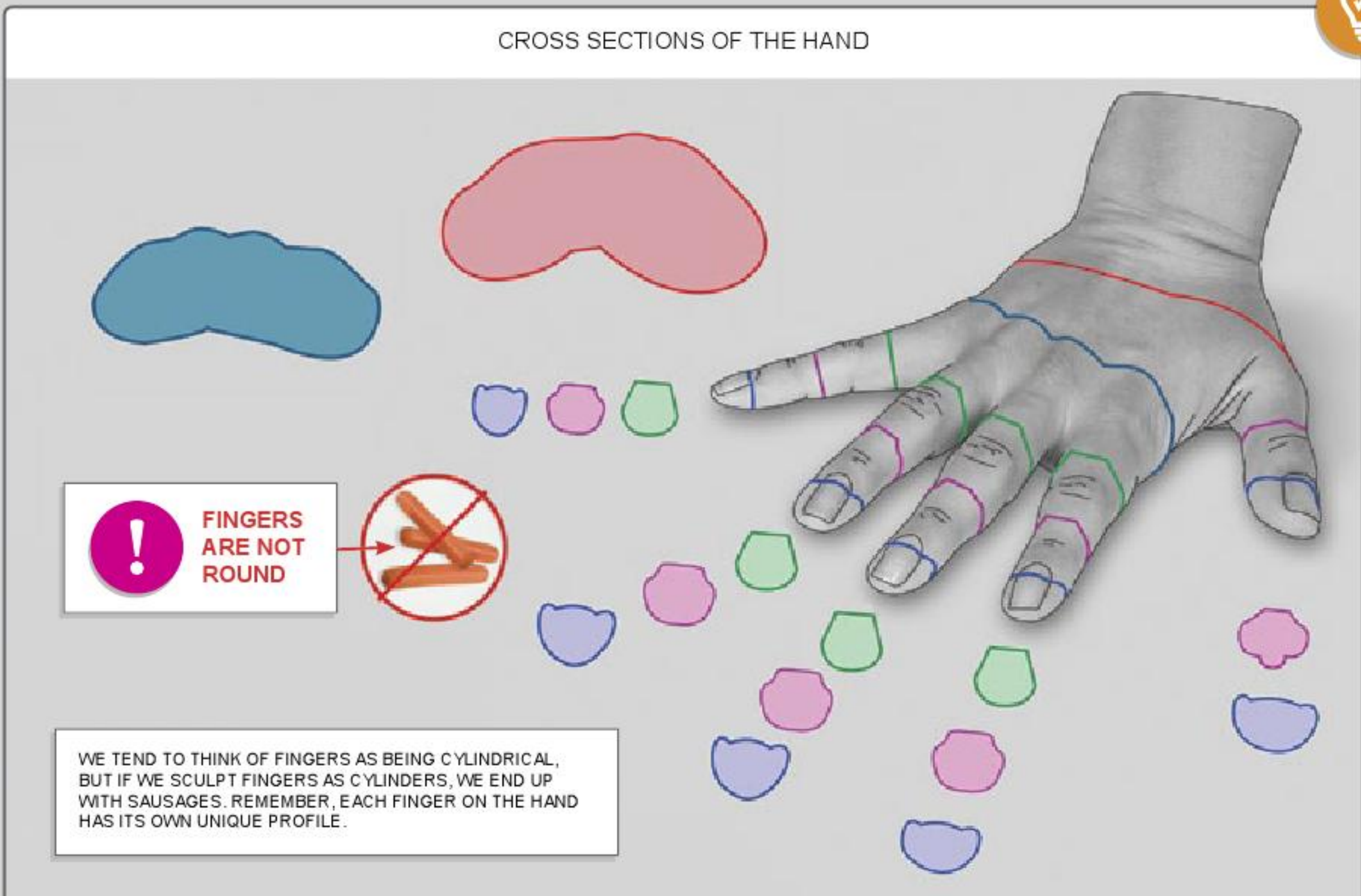
## SHAPES OF THE HAND



PALM IS MADE OF 3 PADS



CROSS SECTIONS OF THE HAND





## IDEALIZED HAND PROPORTIONS

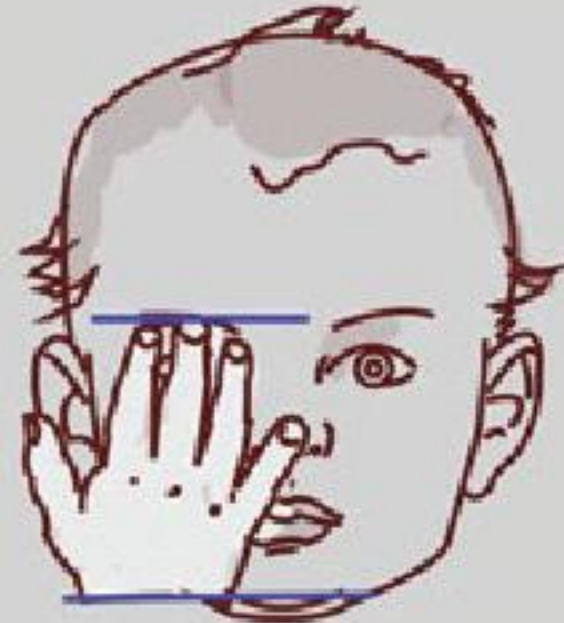
### SIZE OF AN ADULT'S HAND



MAKE SURE YOU ARE MODELING THE HAND LARGE ENOUGH.

IDEALLY, HAND IS THE SAME SIZE AS FACE (FROM TIP OF CHIN TO HAIRLINE).

### BABY

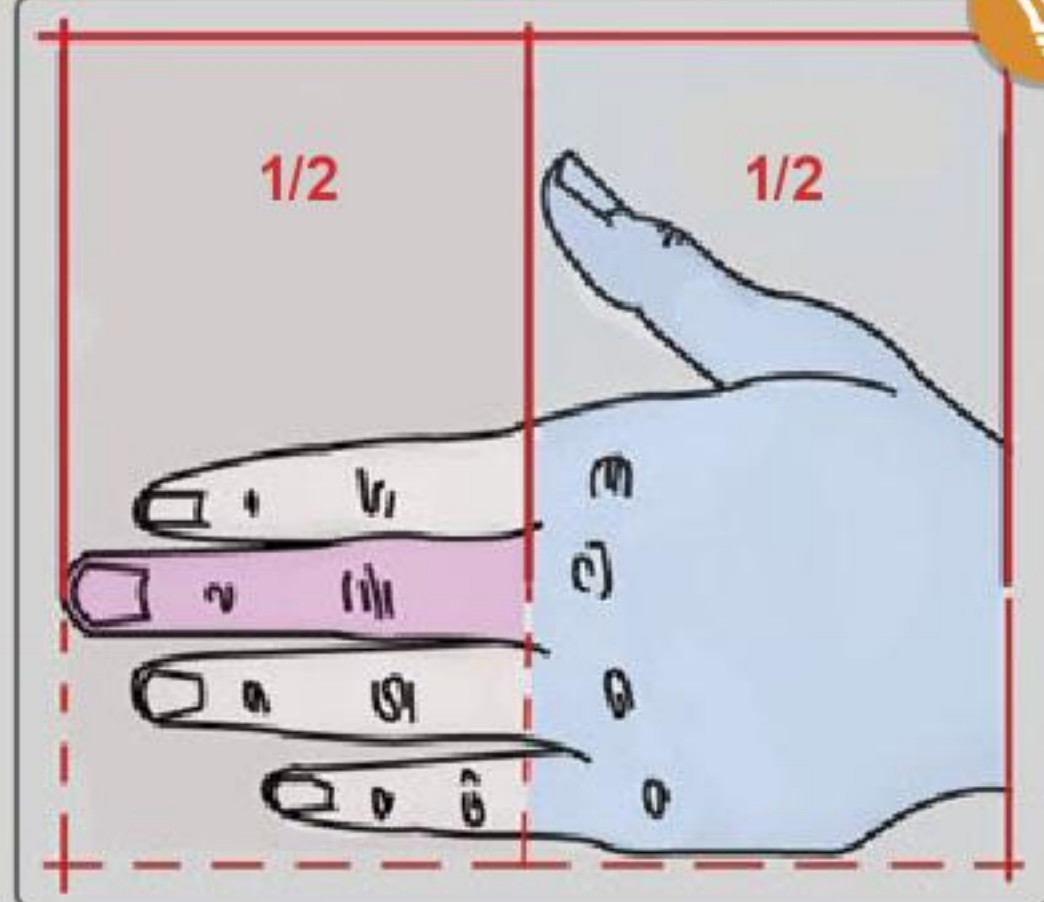


LENGTH OF HAND IS THE DISTANCE FROM CHIN TO EYEBROW LINE.

### TEEN



LENGTH OF HAND IS THE DISTANCE FROM CHIN TO THE MIDDLE OF FOREHEAD.

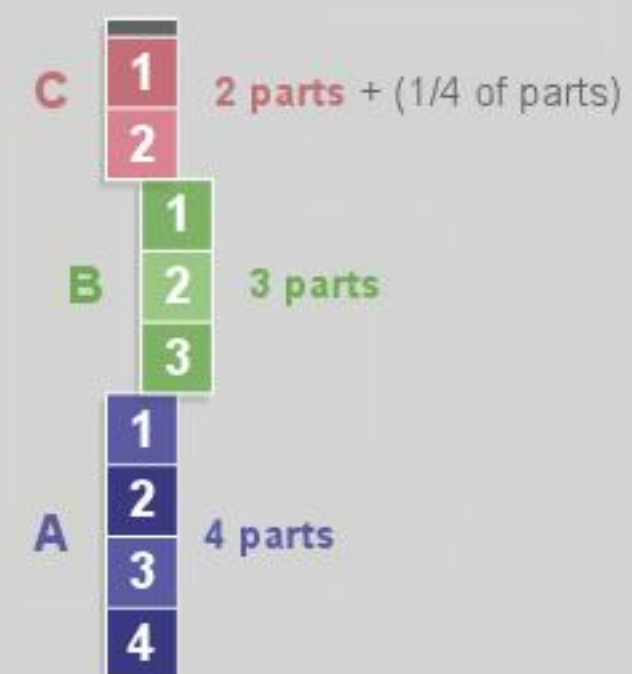


THERE ARE TWO METHODS YOU CAN USE TO CALCULATE FINGER LENGTH.

#### 1st METHOD



#### 2nd METHOD (9+1/4 parts)

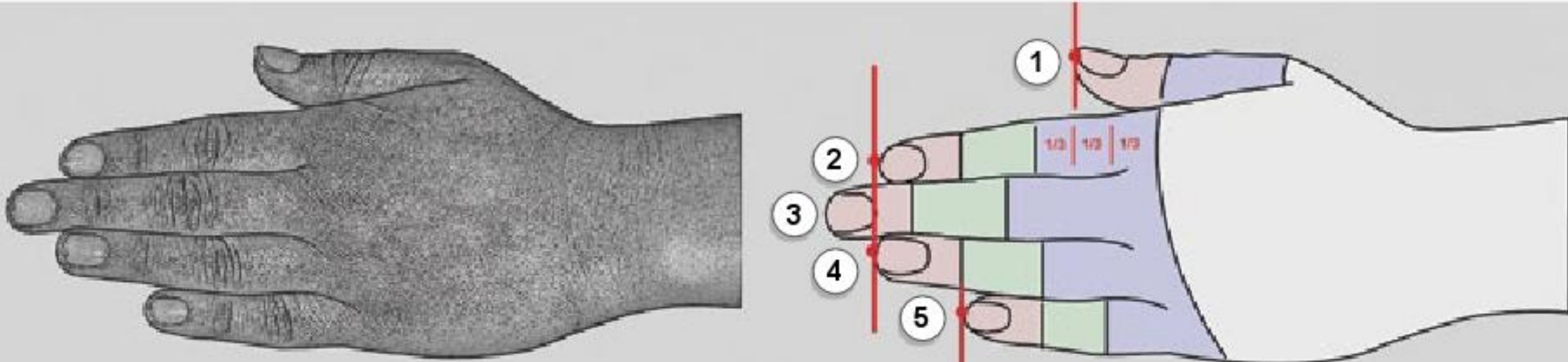




# HAND

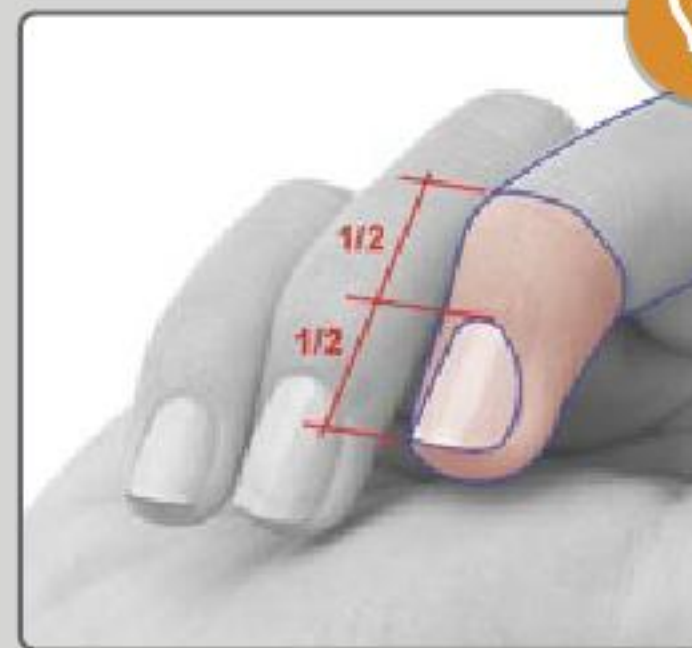
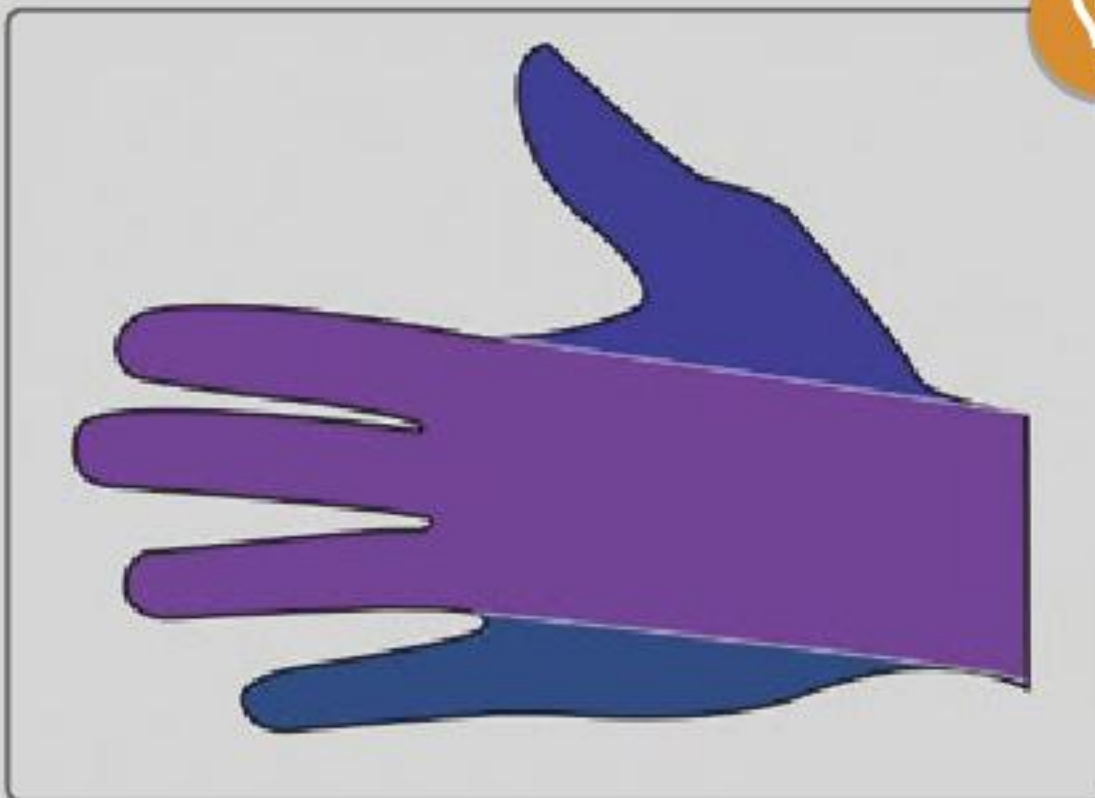
i

## FINGER LENGTHS OF AN IDEALIZED HAND

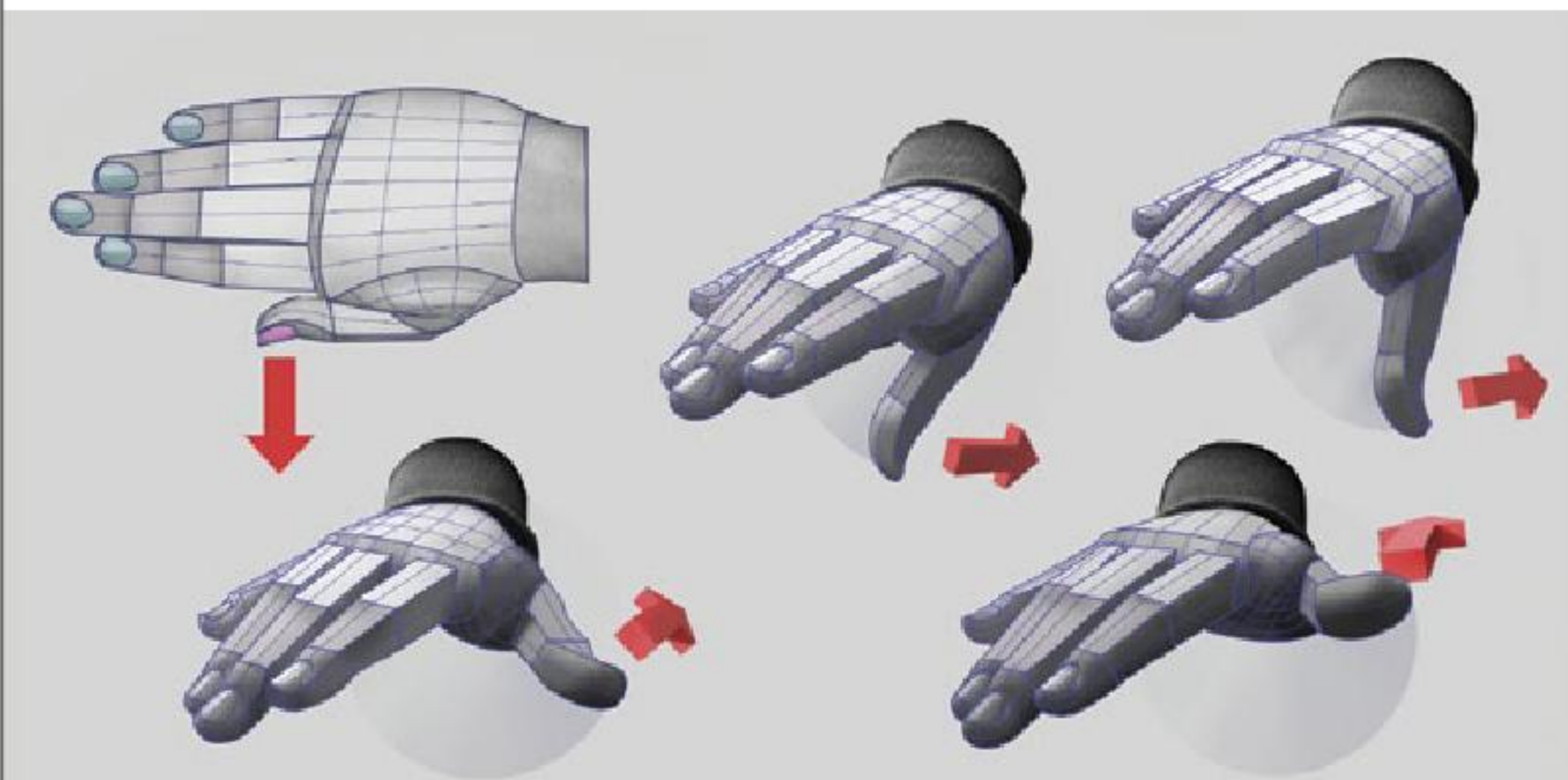


- ① THUMB DOES NOT POSSESS A MIDDLE (INTERMEDIATE) PHALANX!
- ② ③ ④ ⑤ FINGERS CONSIST OF 3 PHALANGES: PROXIMAL, MIDDLE AND DISTAL.

② = ④



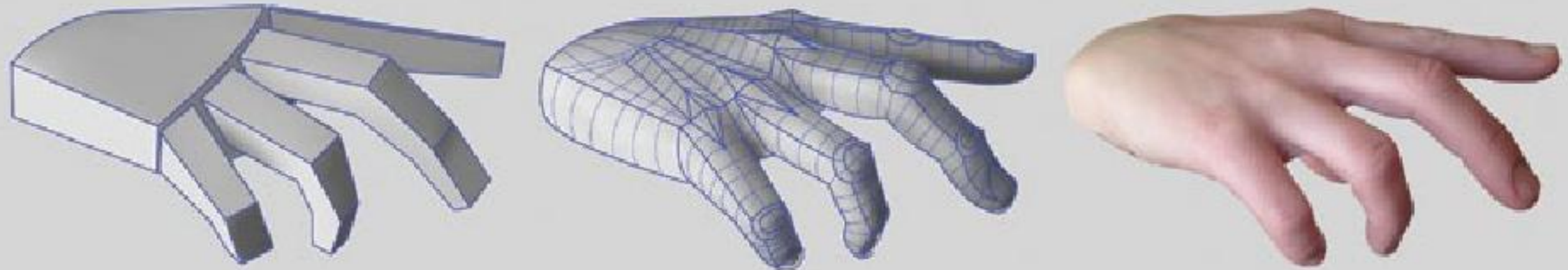
## THUMB NAIL FACES A DIFFERENT DIRECTION THAN OTHER NAILS.



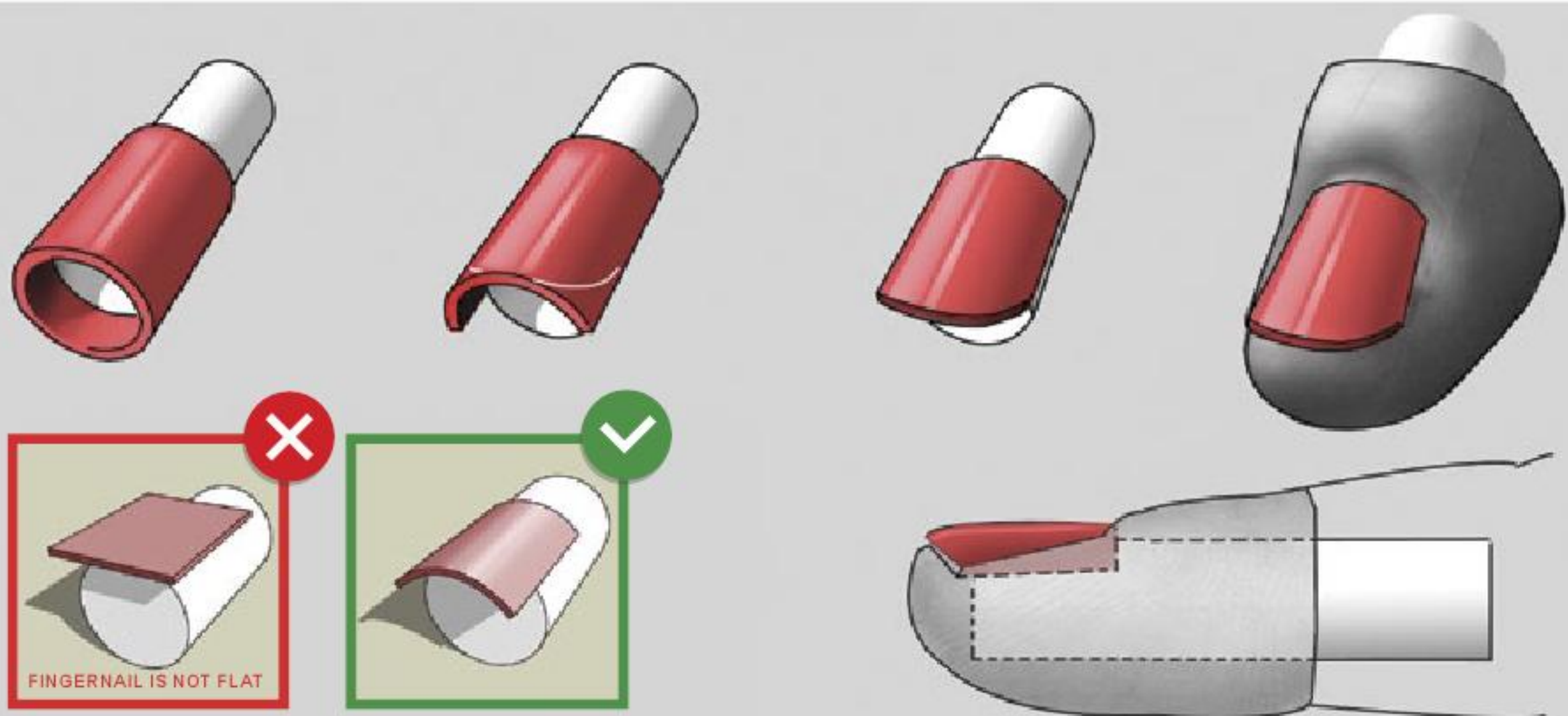


## SHAPING HAND AND FINGERS

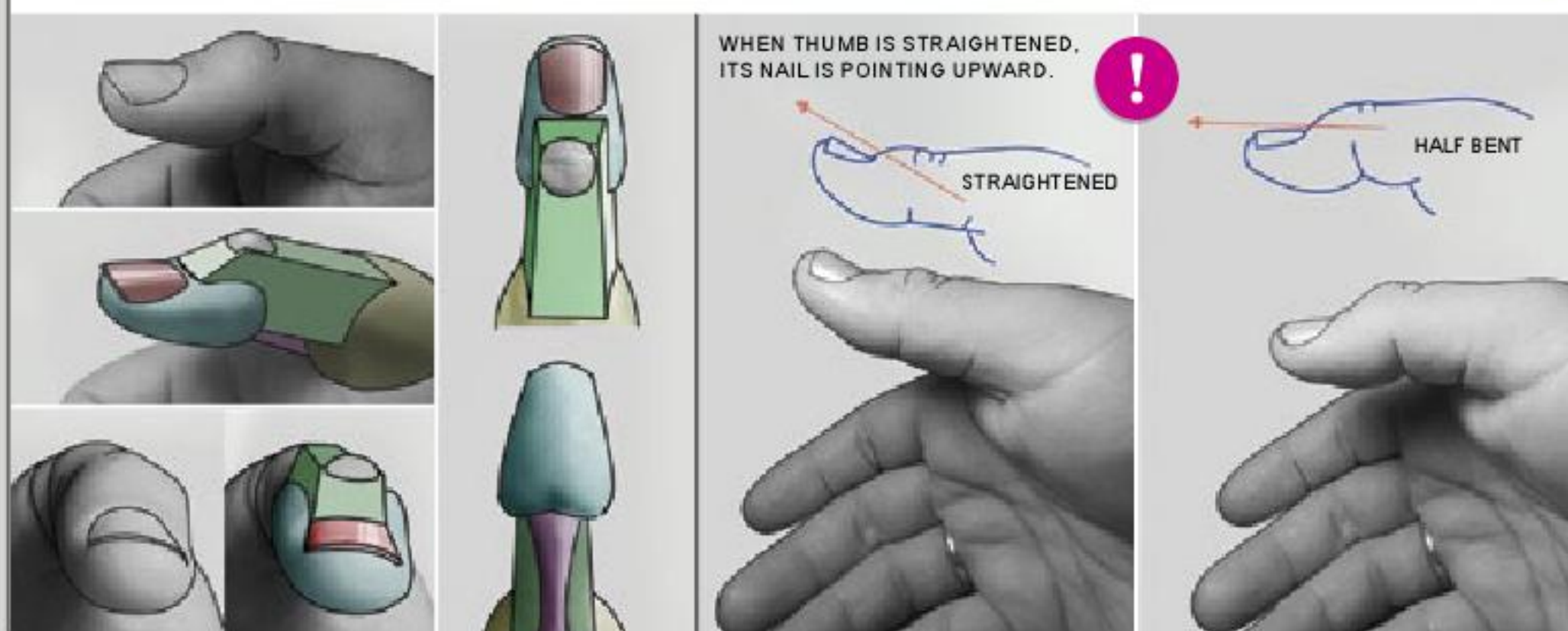
IT IS MUCH EASIER TO BEGIN MODELING FINGERS FROM SIMPLE SQUARE FORMS.



FINGERNAIL



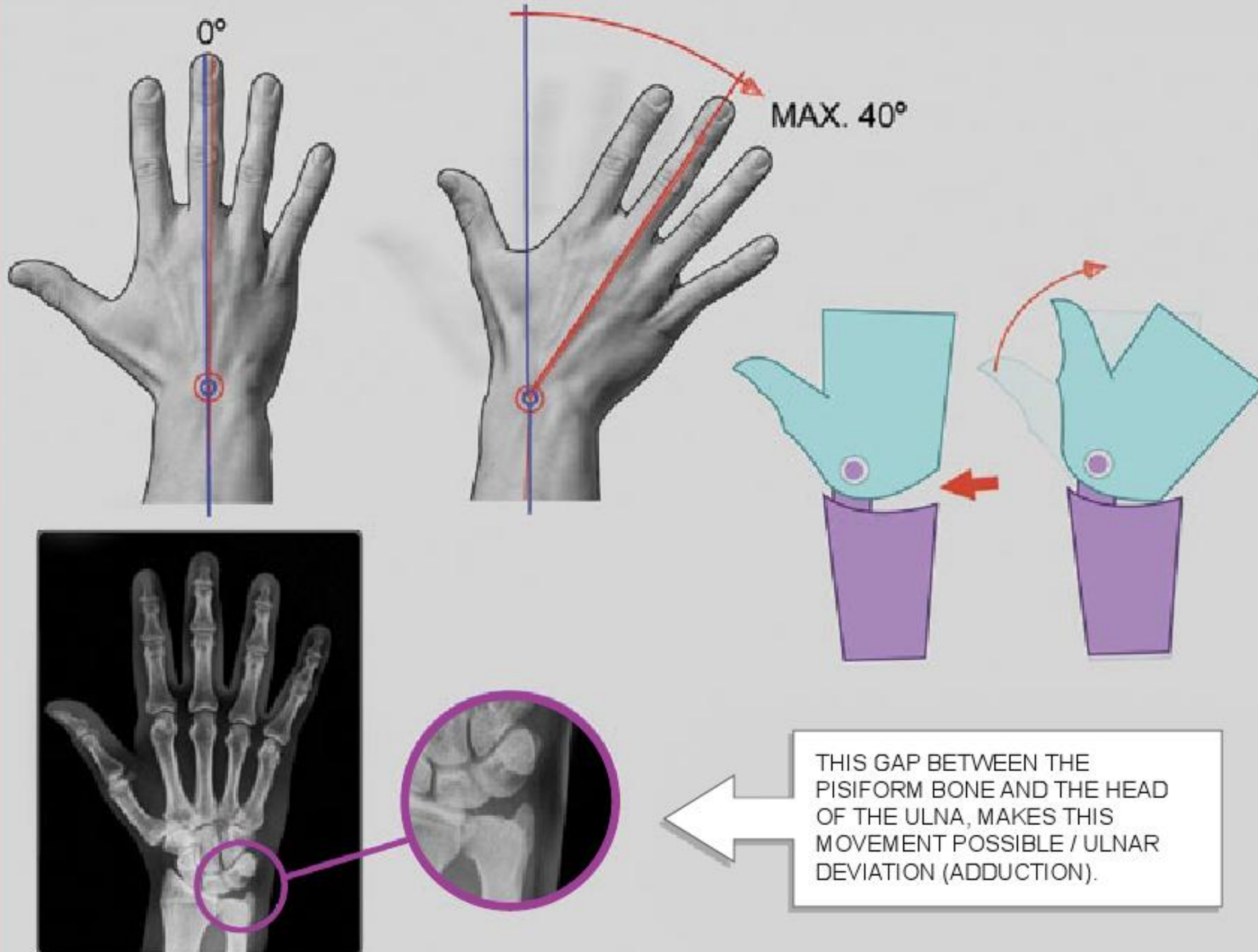
**THUMB** IS SHAPED DIFFERENTLY THAN OTHER FINGERS.



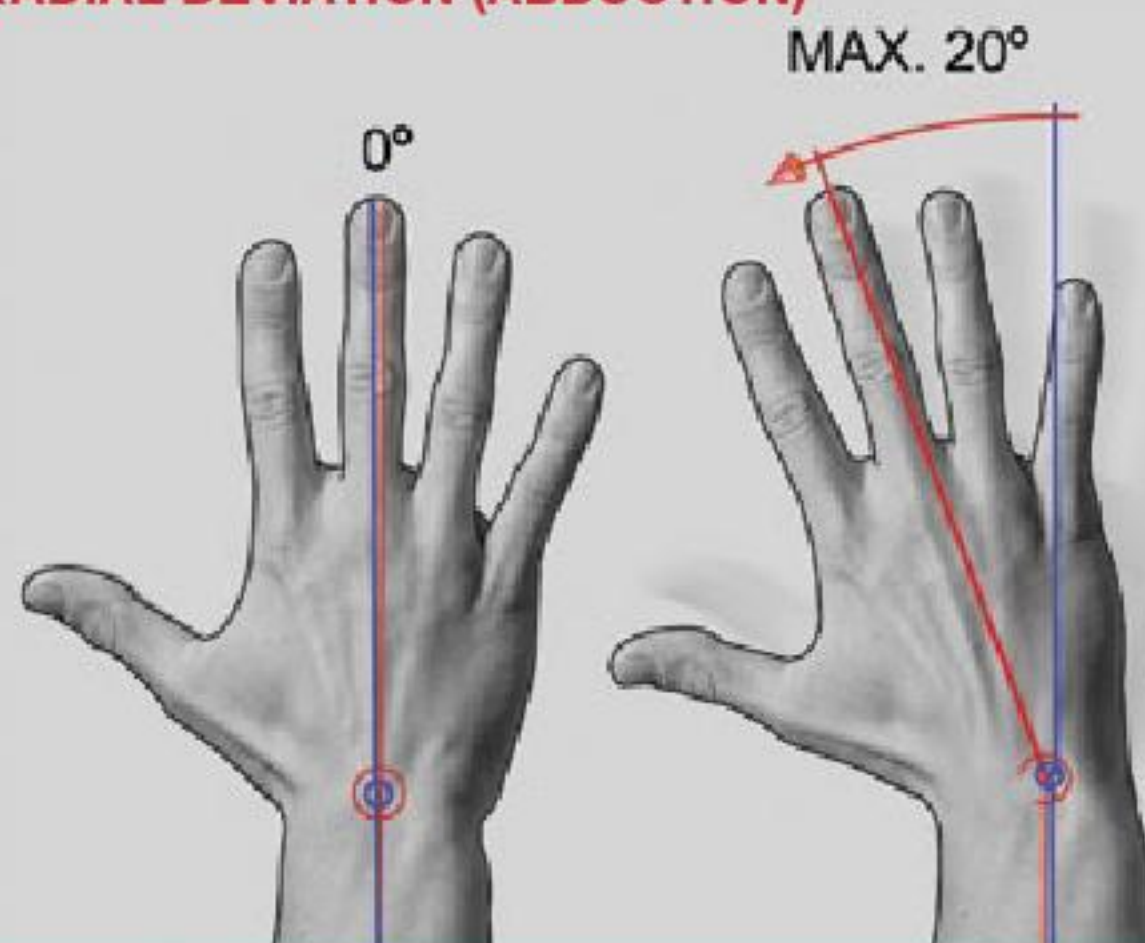


## HAND MOVEMENTS

## ULNAR DEVIATION (ADDUCTION)



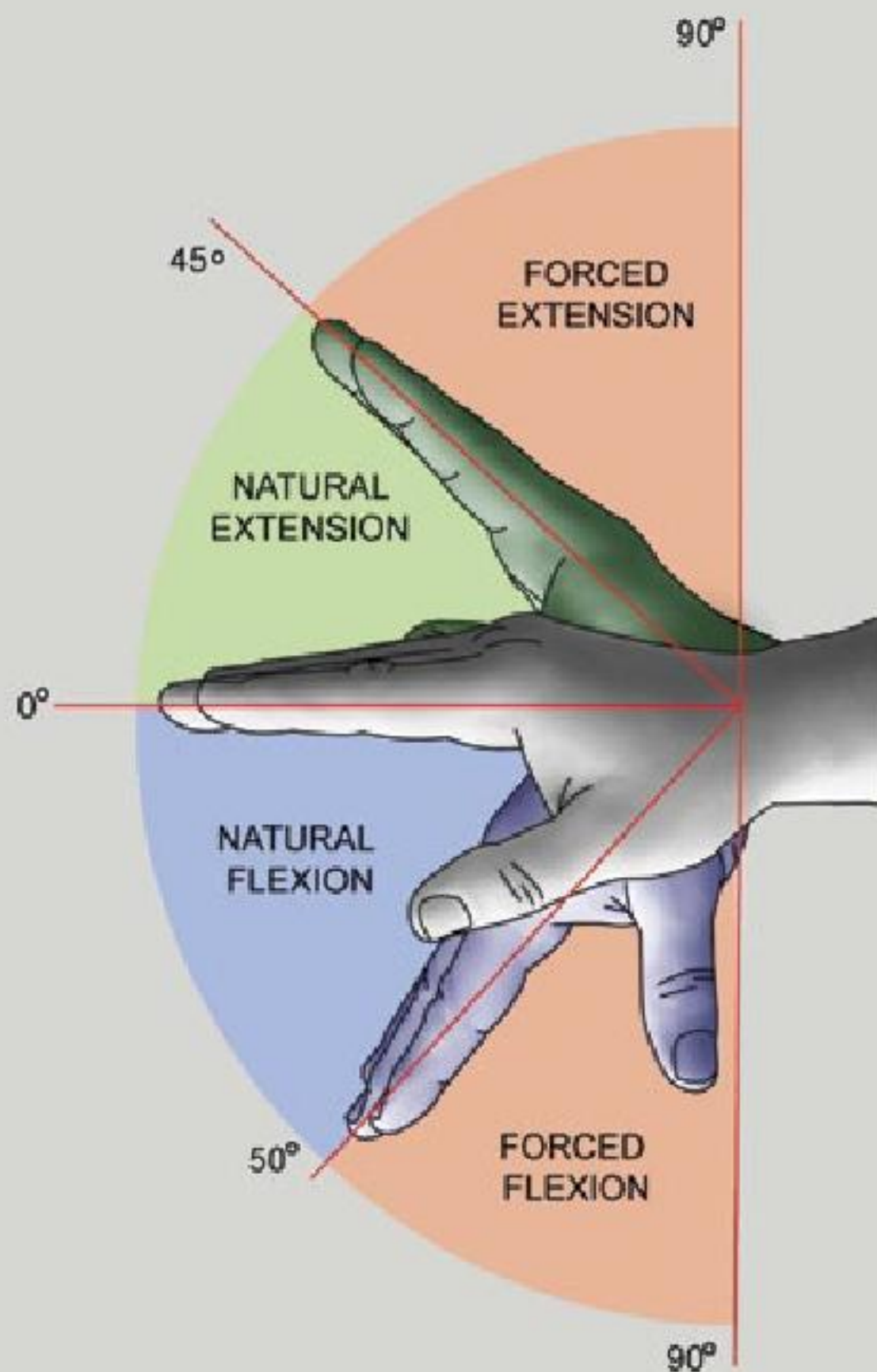
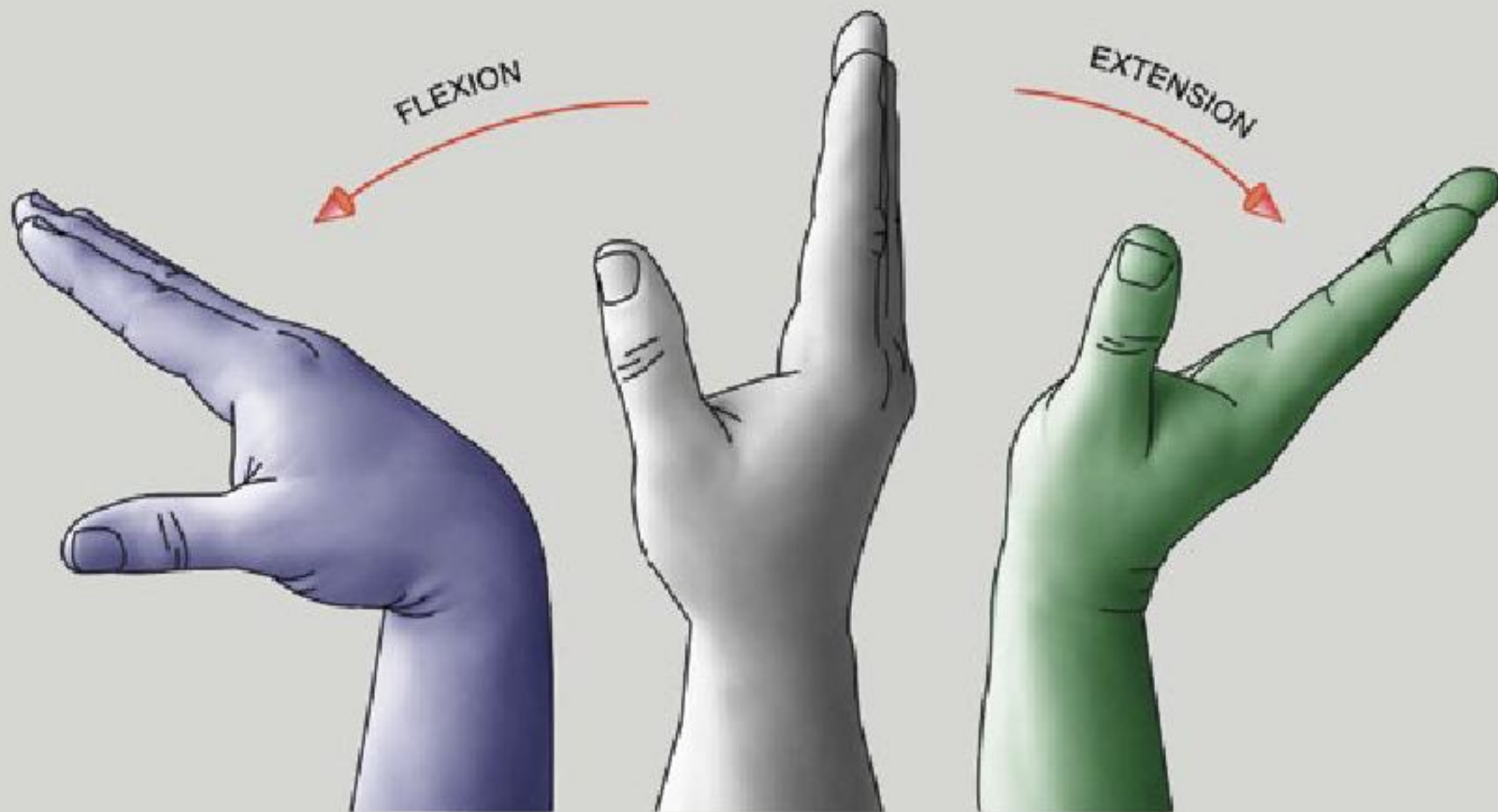
## RADIAL DEVIATION (ABDUCTION)



IT'S AN UNNATURAL MOTION: THERE AREN'T ANY MUSCLES DESIGNED SPECIFICALLY TO DO THIS MOVEMENT, SO THE EFFORT COMES FROM THE FLEXOR AND EXTENSOR TENDONS. **WOULD BE BETTER TO AVOID SCULPTING THIS HAND POSITION!**



## WRIST POSITIONS



EXTENSION



FORCED EXTENSION



FLEXION

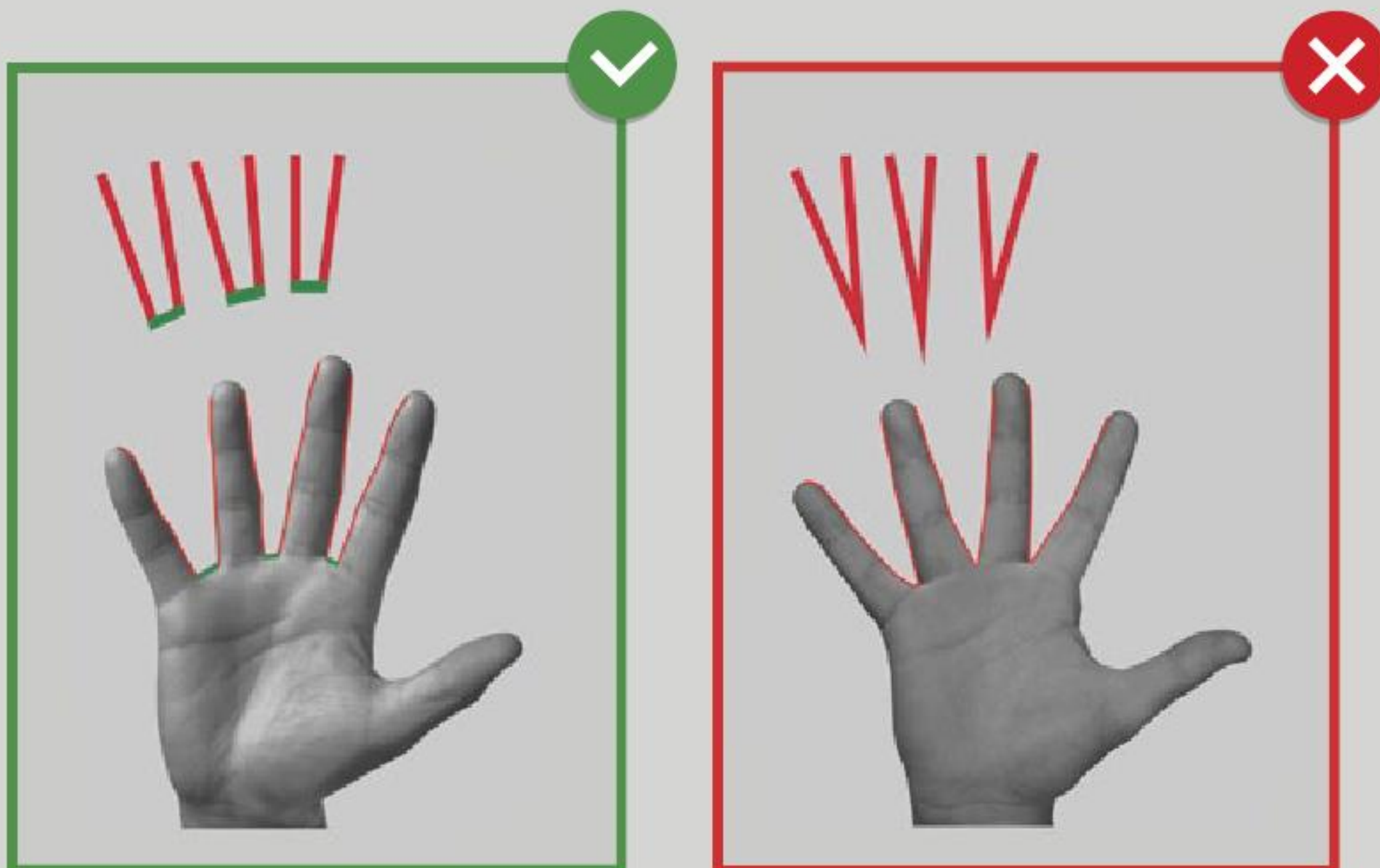
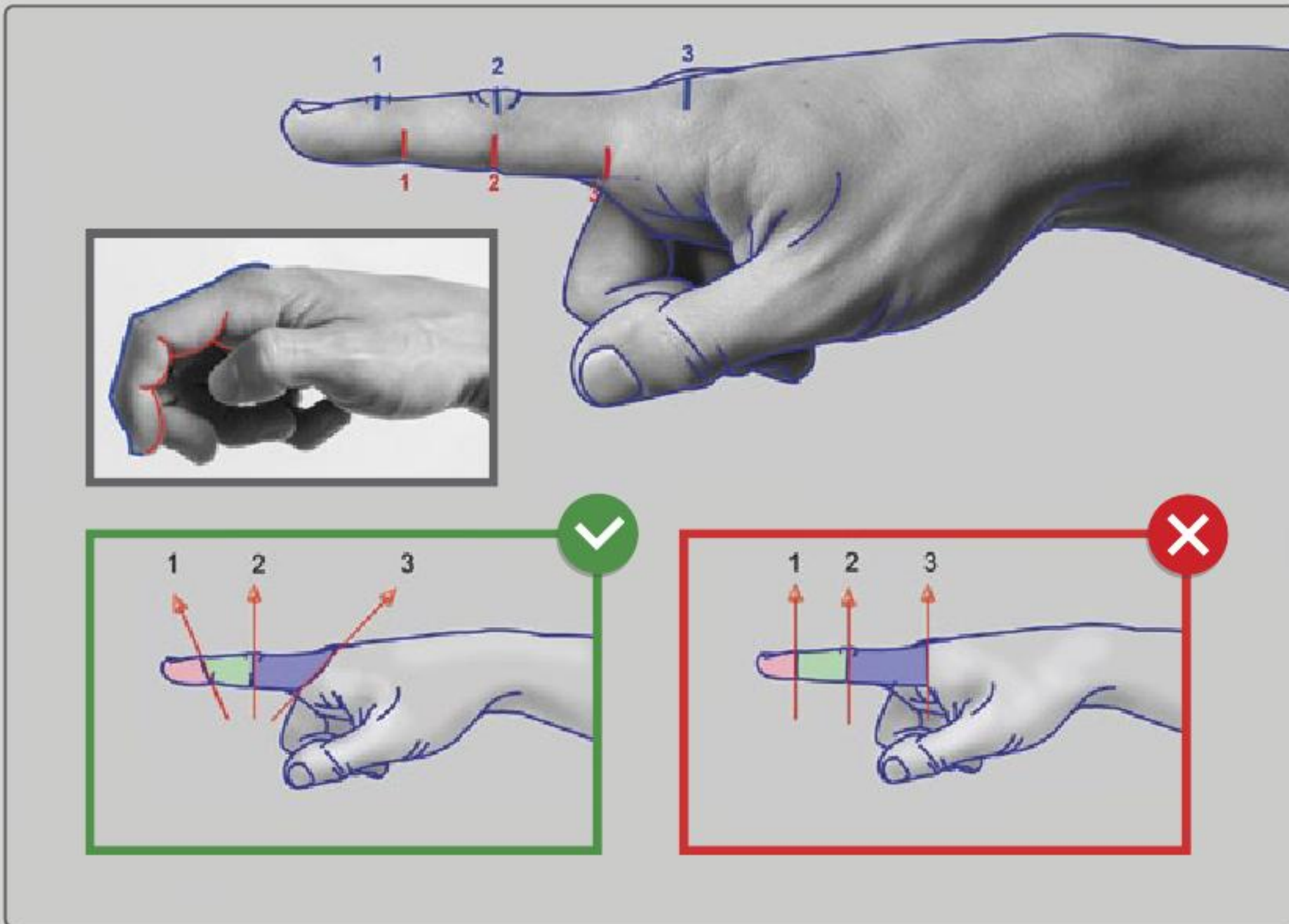


FORCED FLEXION



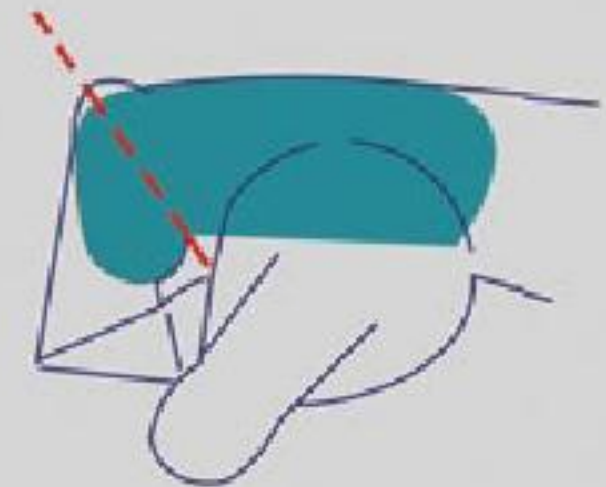
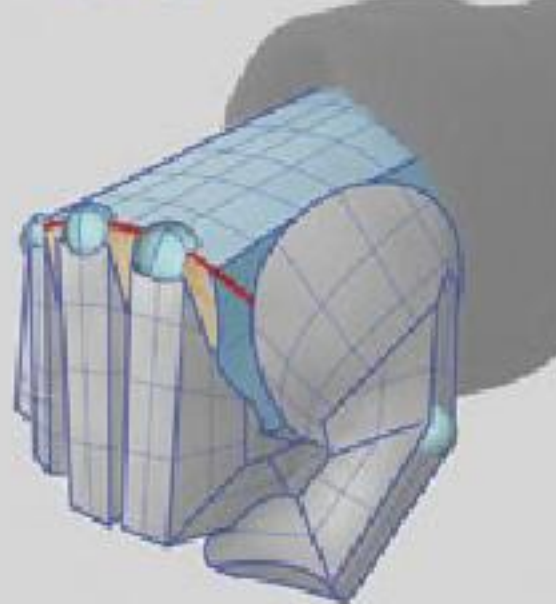
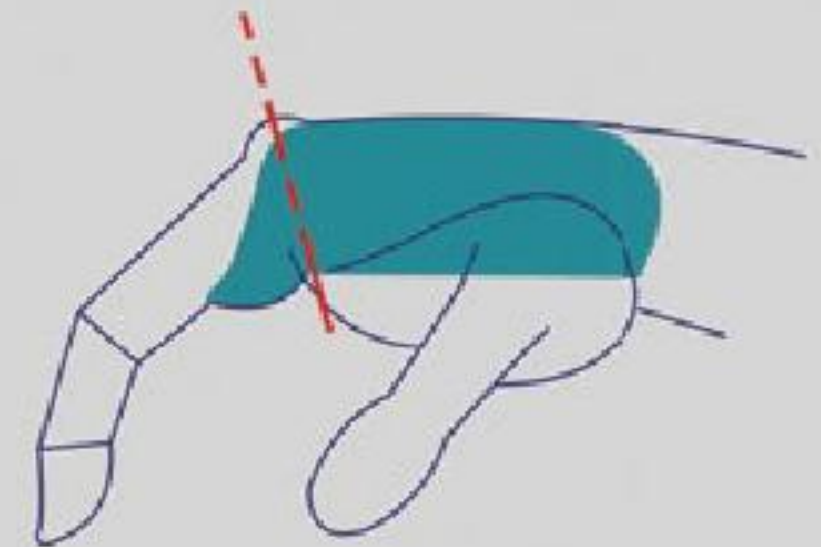
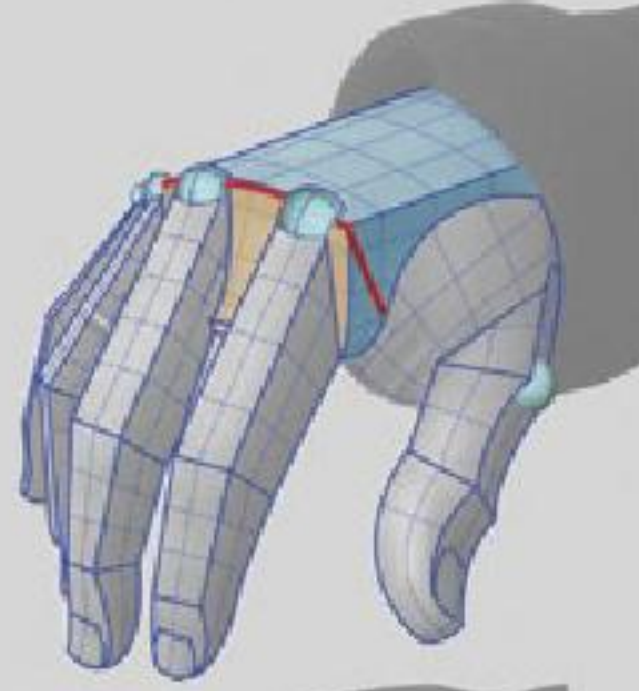
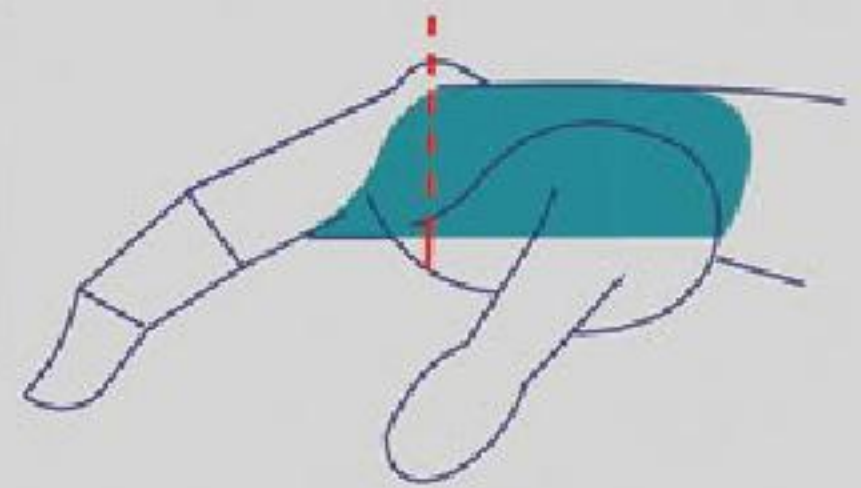
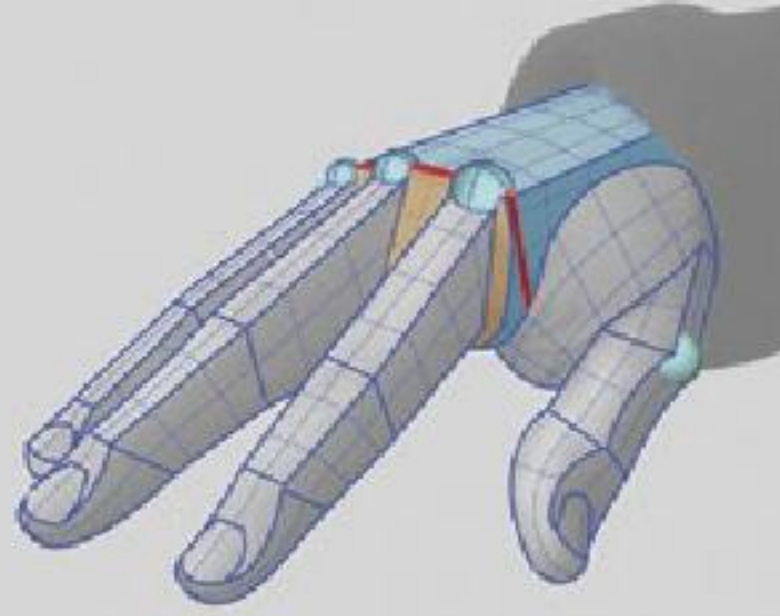


## CREASES AND GAPS OF FINGERS



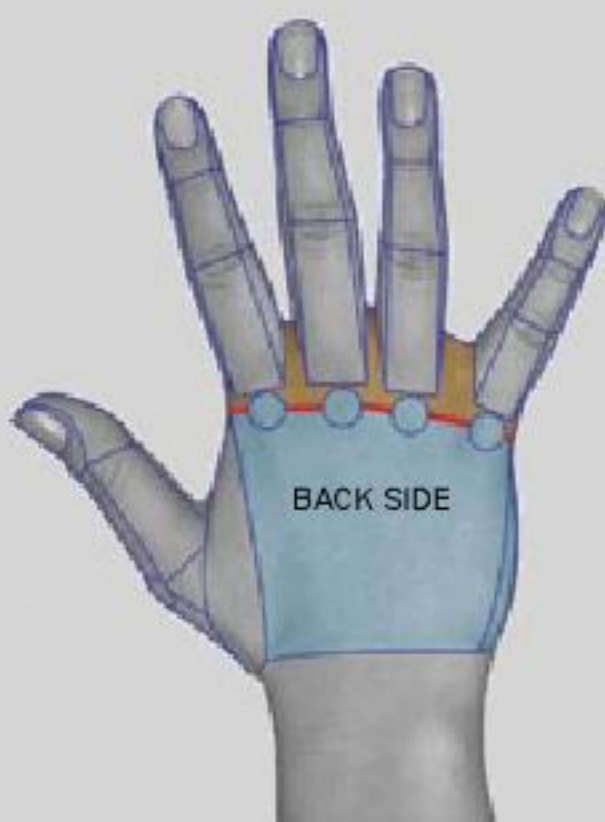


## BENDING AND CONNECTION LINE OF FINGERS

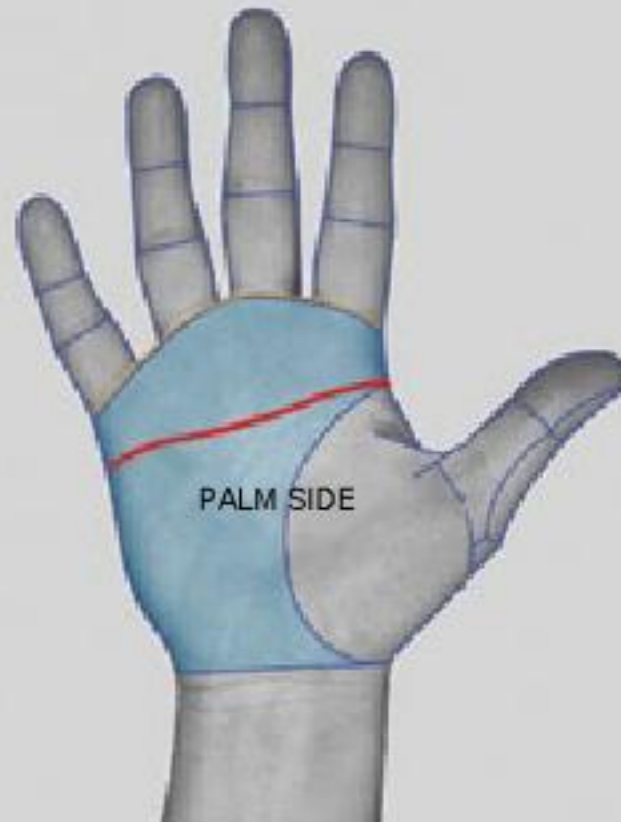


FINGERS ARE SHORTER FROM PALM SIDE OF THE HAND.

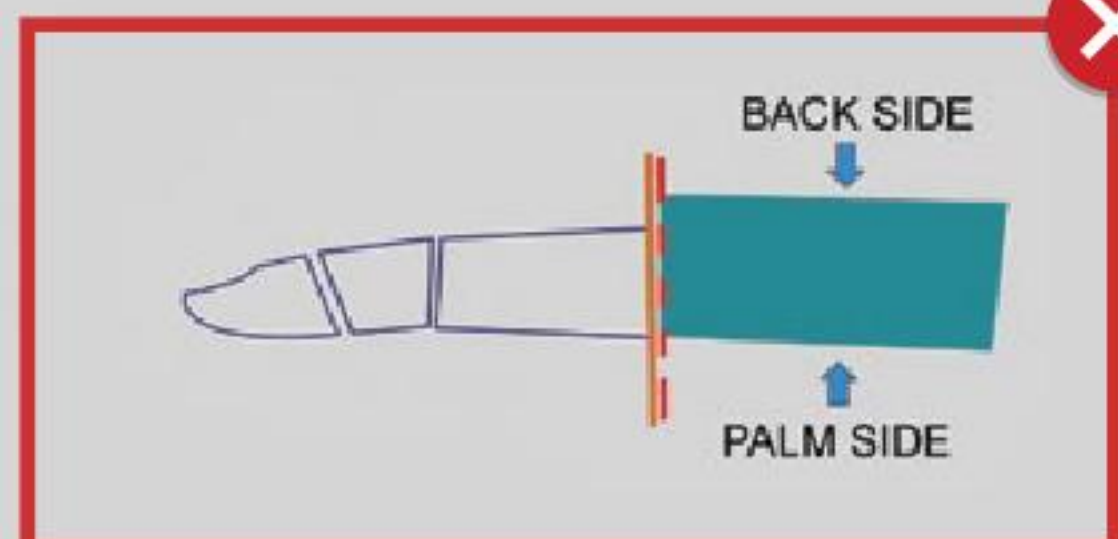
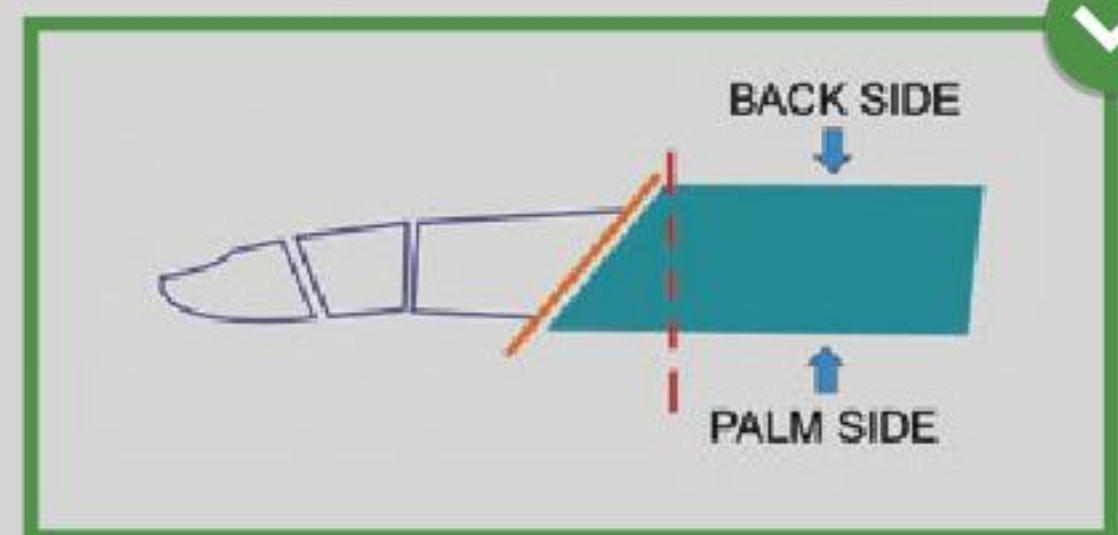
**CREASE LINE** ON THE PALM DOES NOT MATCH UP WITH **CONNECTION LINE** WHERE FINGERS JOIN **THE BODY OF THE HAND**.



BACK SIDE

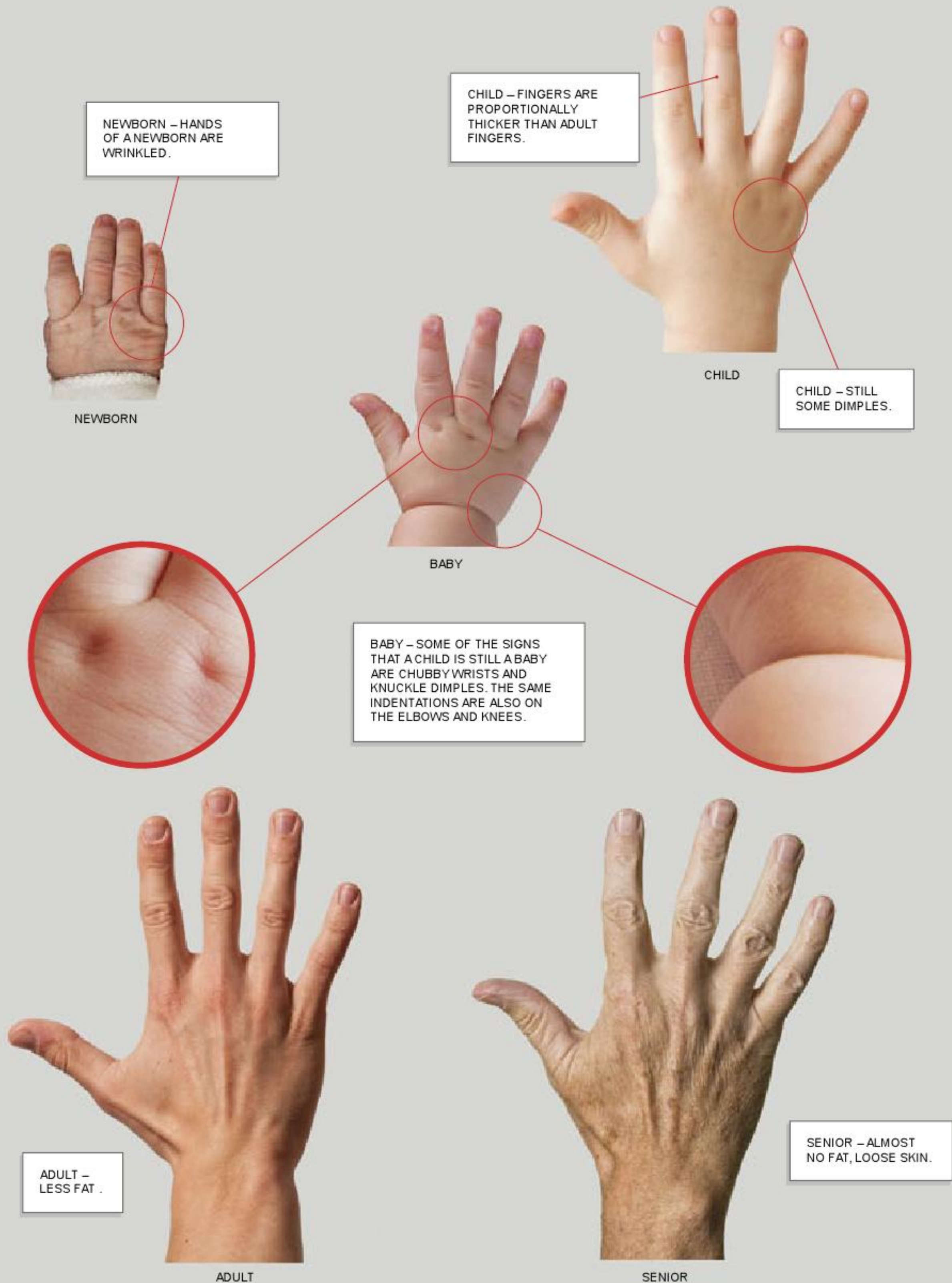


PALM SIDE





## HOW HANDS AGE

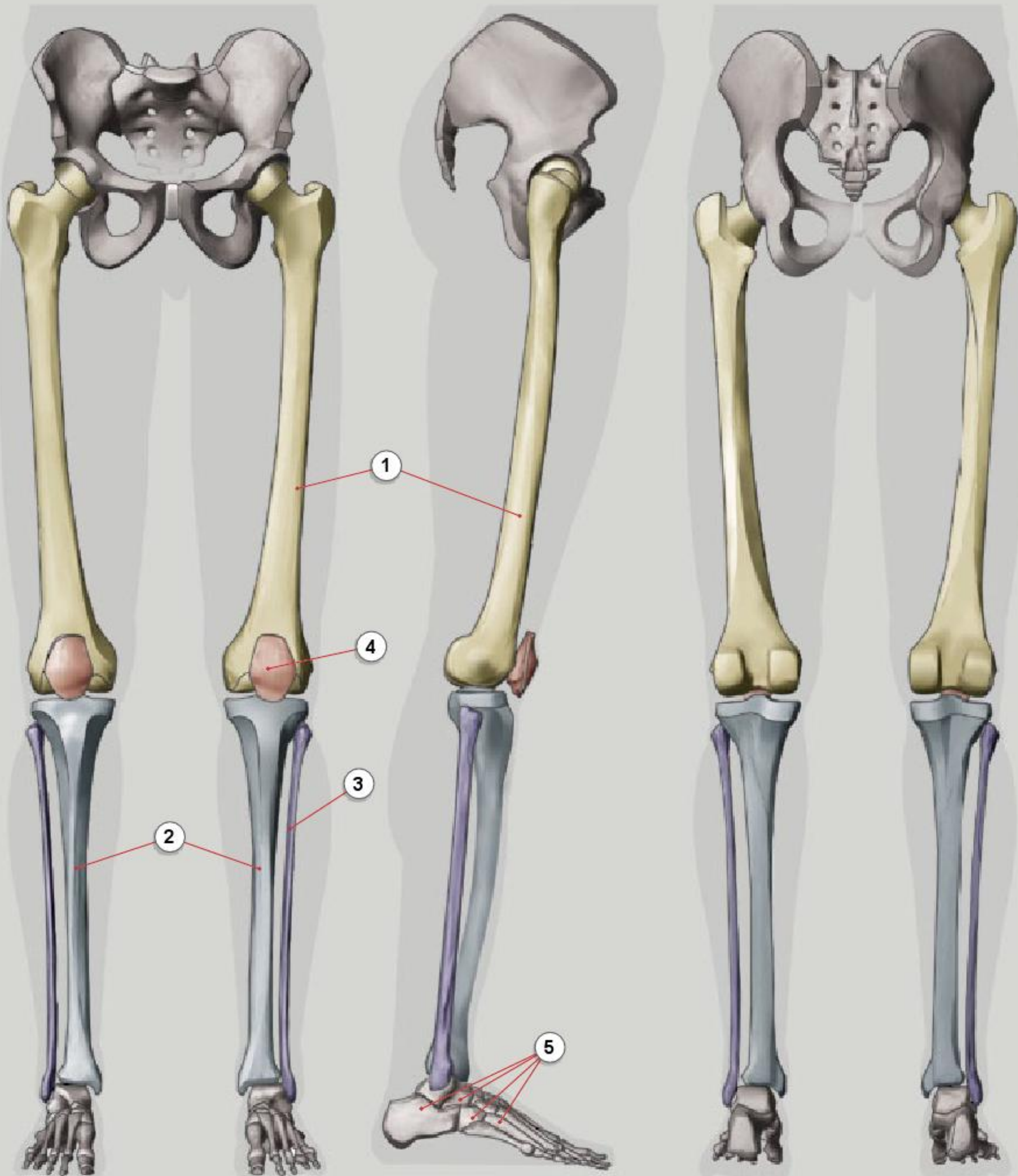








## BONES OF LOWER LIMB



1 FEMUR

2 TIBIA

3 FIBULA

4 KNEE CAP (patella)

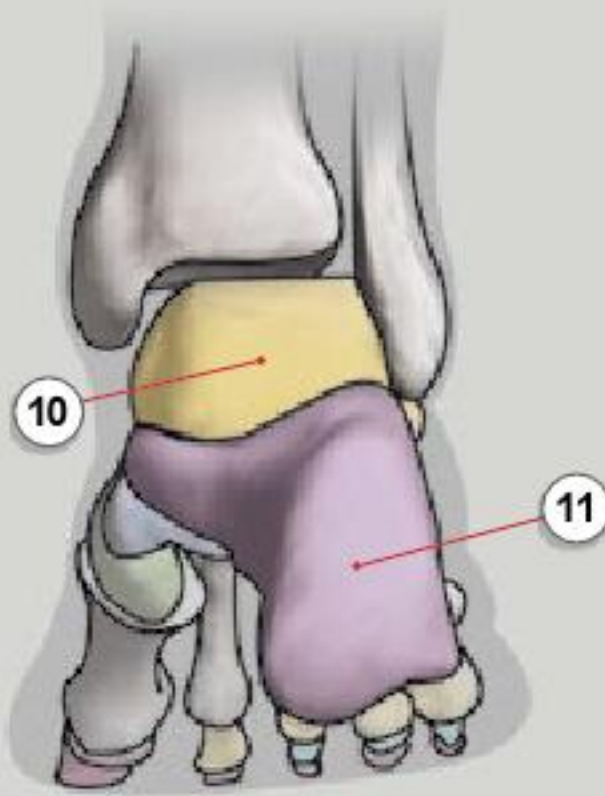
5 BONES OF THE FOOT



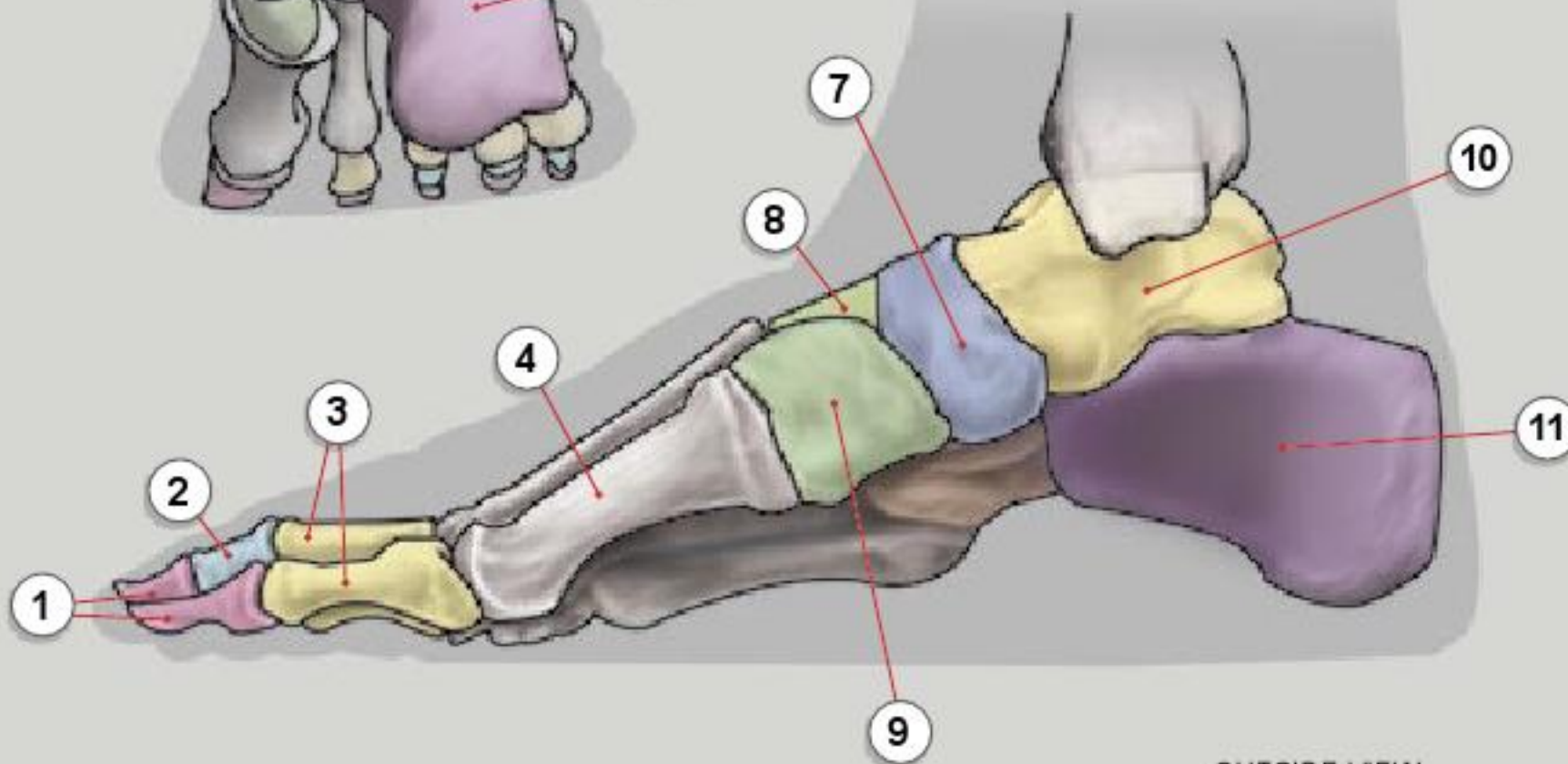
# BONES OF THE FOOT



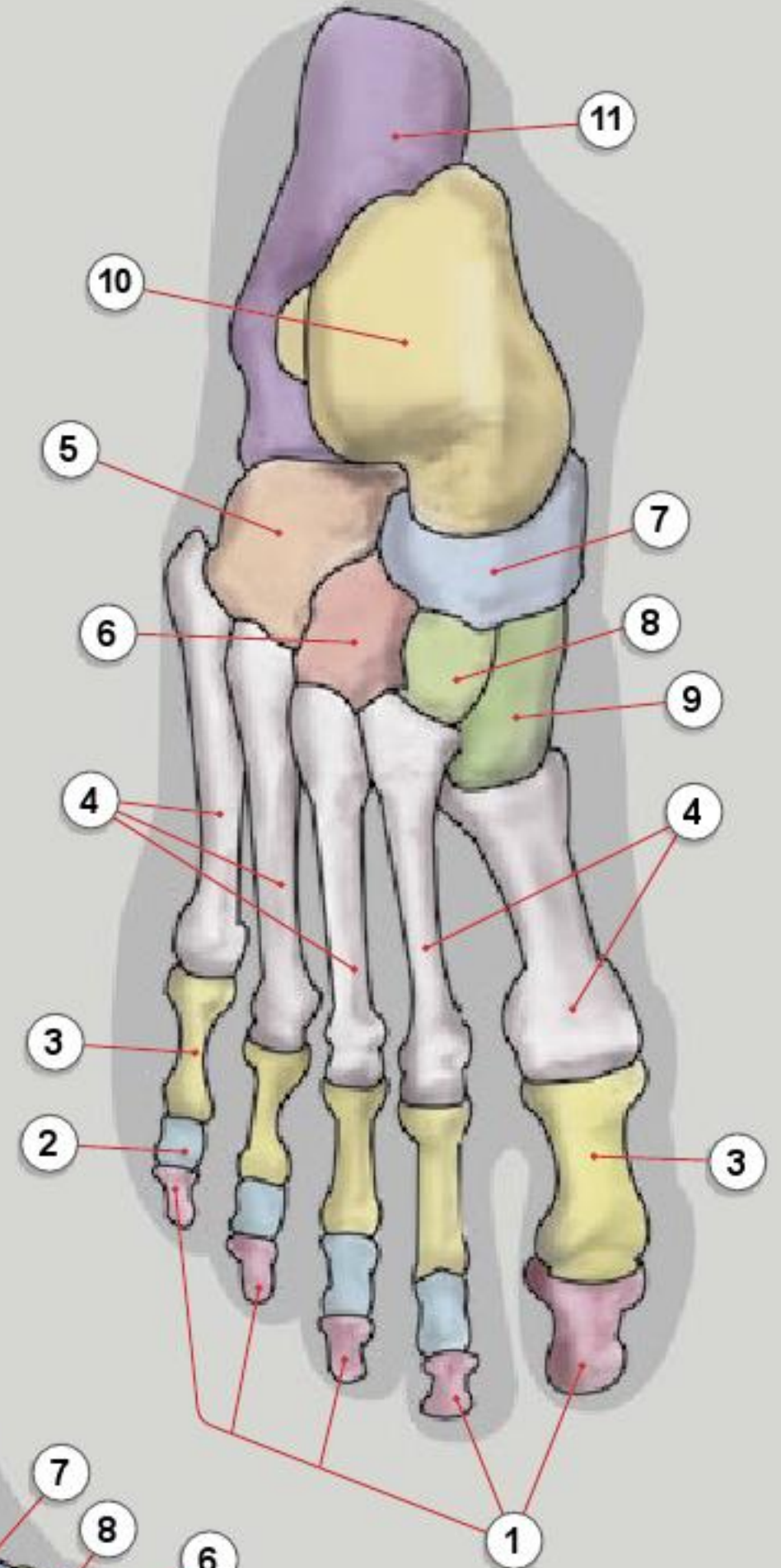
BACK VIEW



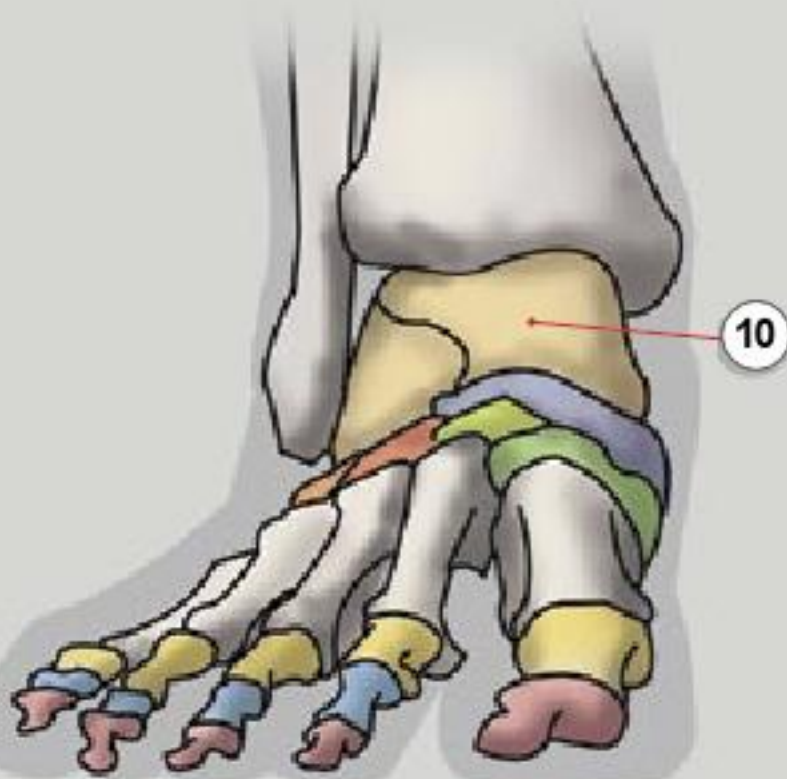
INSIDE VIEW



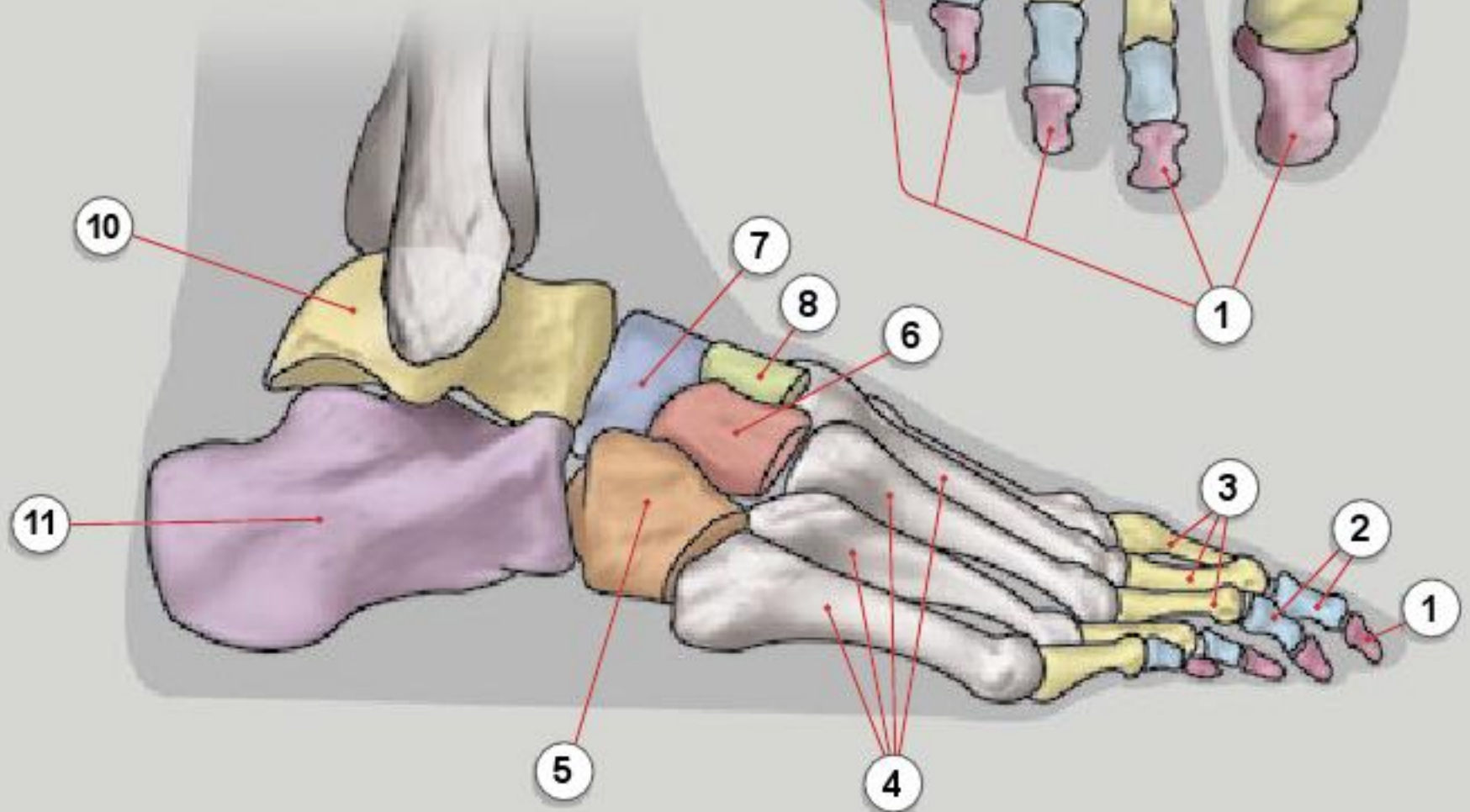
TOP VIEW



FRONT VIEW



OUTSIDE VIEW

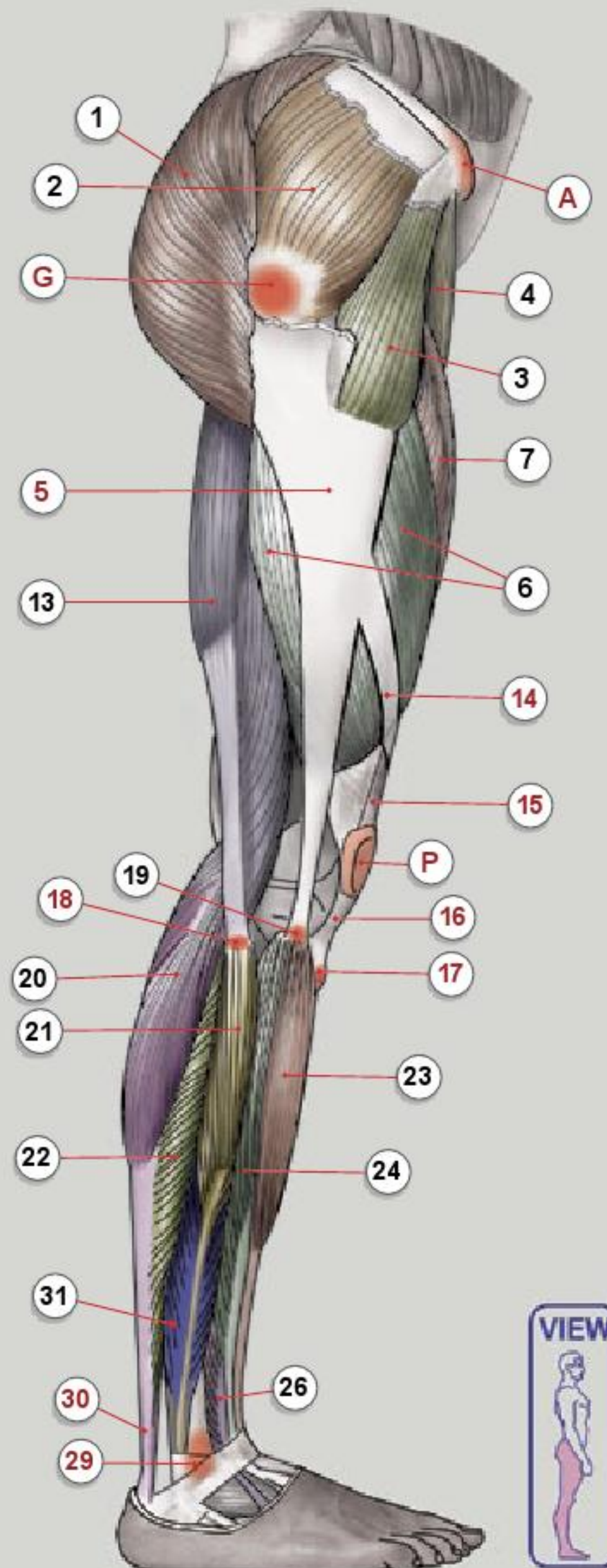
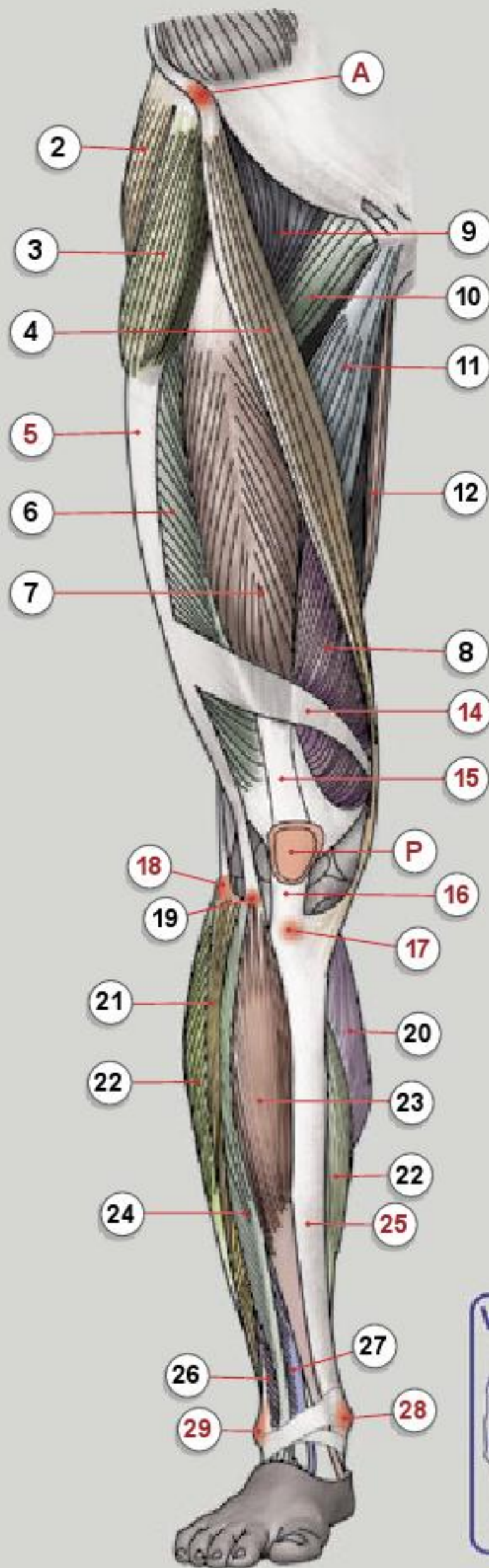


- |                      |                          |                          |
|----------------------|--------------------------|--------------------------|
| 1 DISTAL PHALANGES   | 5 CUBOID                 | 9 MEDIAL CUNEIFORM       |
| 2 MIDDLE PHALANGES   | 6 LATERAL CUNEIFORM      | 10 TALUS                 |
| 3 PROXIMAL PHALANGES | 7 NAVICULAR              | 11 HEEL BONE (calcaneus) |
| 4 METATARSAL BONES   | 8 INTERMEDIATE CUNEIFORM |                          |



# MUSCLES OF LOWER LIMB

i

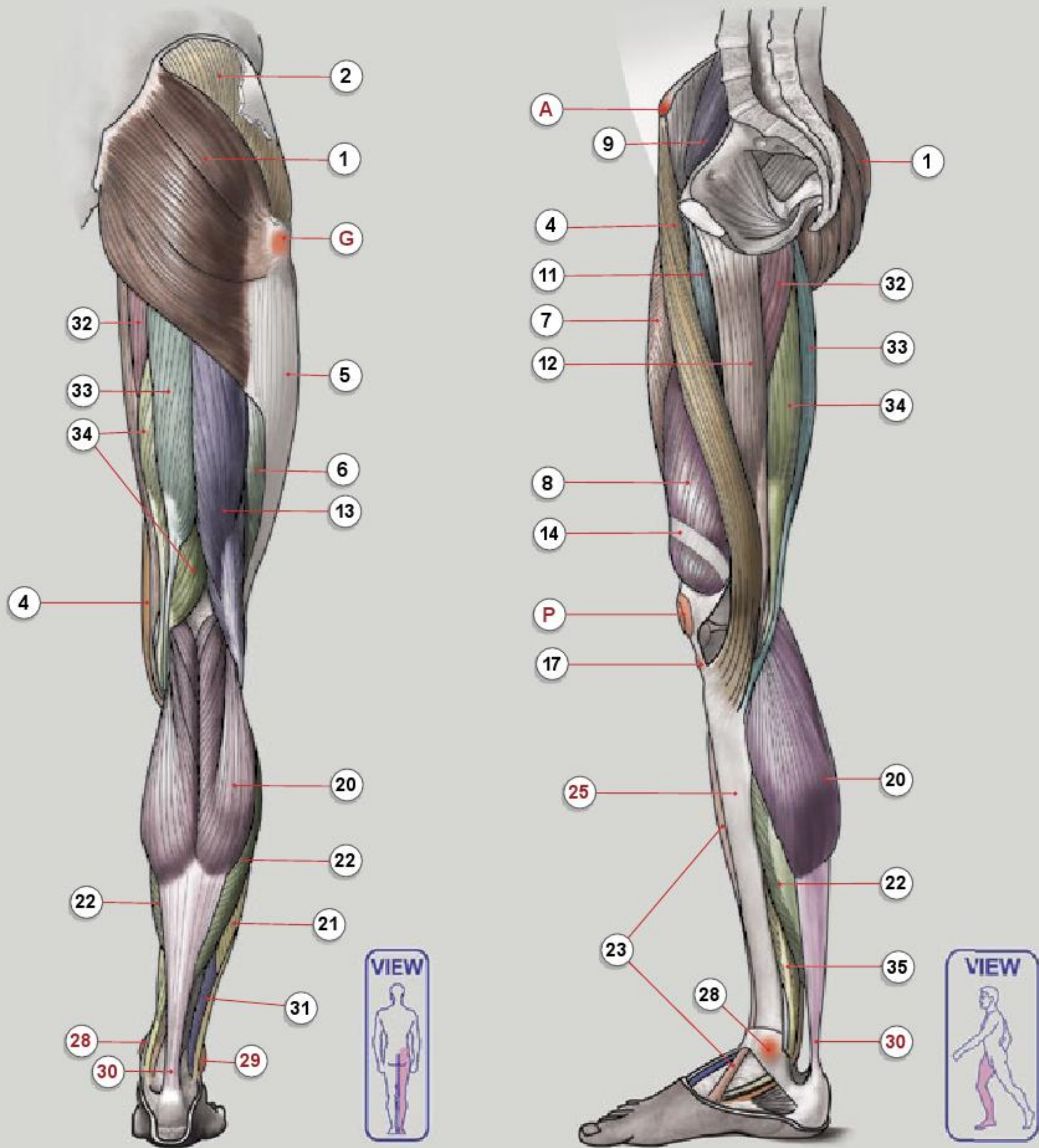


|                               |                           |                             |
|-------------------------------|---------------------------|-----------------------------|
| <b>A</b> A.S.I.S.             | <b>5</b> ILIOTIBIAL BAND  | <b>12</b> GRACILIS          |
| <b>G</b> GREATER TROCHANTER   | <b>6</b> VASTUS LATERALIS | <b>13</b> BICEPS FEMORIS    |
| <b>P</b> KNEE CAP (PATELLA)   | <b>7</b> RECTUS FEMORIS   | <b>14</b> RICHER'S BAND     |
| <b>1</b> GLUTEUS MAXIMUS      | <b>8</b> VASTUS MEDIALIS  | <b>15</b> QUADRICEPS TENDON |
| <b>2</b> GLUTEUS MEDIUS       | <b>9</b> ILIOPSOAS        | <b>16</b> PATELLAR LIGAMENT |
| <b>3</b> TENSOR FASCIAE LATAE | <b>10</b> PECTINEUS       | <b>17</b> TIBIAL TUBEROSITY |
| <b>4</b> SARTORIUS            | <b>11</b> ADDUCTOR LONGUS | <b>18</b> HEAD OF FIBULA    |



# MUSCLES OF LOWER LIMB

i



- |                              |                                 |                            |
|------------------------------|---------------------------------|----------------------------|
| 19 LATERAL TIBIAL CONDYLE    | 25 MEDIAL SURFACE OF TIBIA      | 31 PERONEUS BREVIS         |
| 20 GASTROCNEMIUS             | 26 PERONEUS TERTIUS             | 32 ADDUCTOR MAGNUS         |
| 21 PERONEUS LONGUS           | 27 EXTENSOR HALLUCIS LONGUS     | 33 SEMITENDINOSUS          |
| 22 SOLEUS                    | 28 MEDIAL ANKLE (M. MALLEOLUS)  | 34 SEMIMEMBRANOSUS         |
| 23 TIBIALIS ANTERIOR         | 29 LATERAL ANKLE (L. MALLEOLUS) | 35 FLEXOR DIGITORUM LONGUS |
| 24 EXTENSOR DIGITORUM LONGUS | 30 ACHILLES TENDON              |                            |

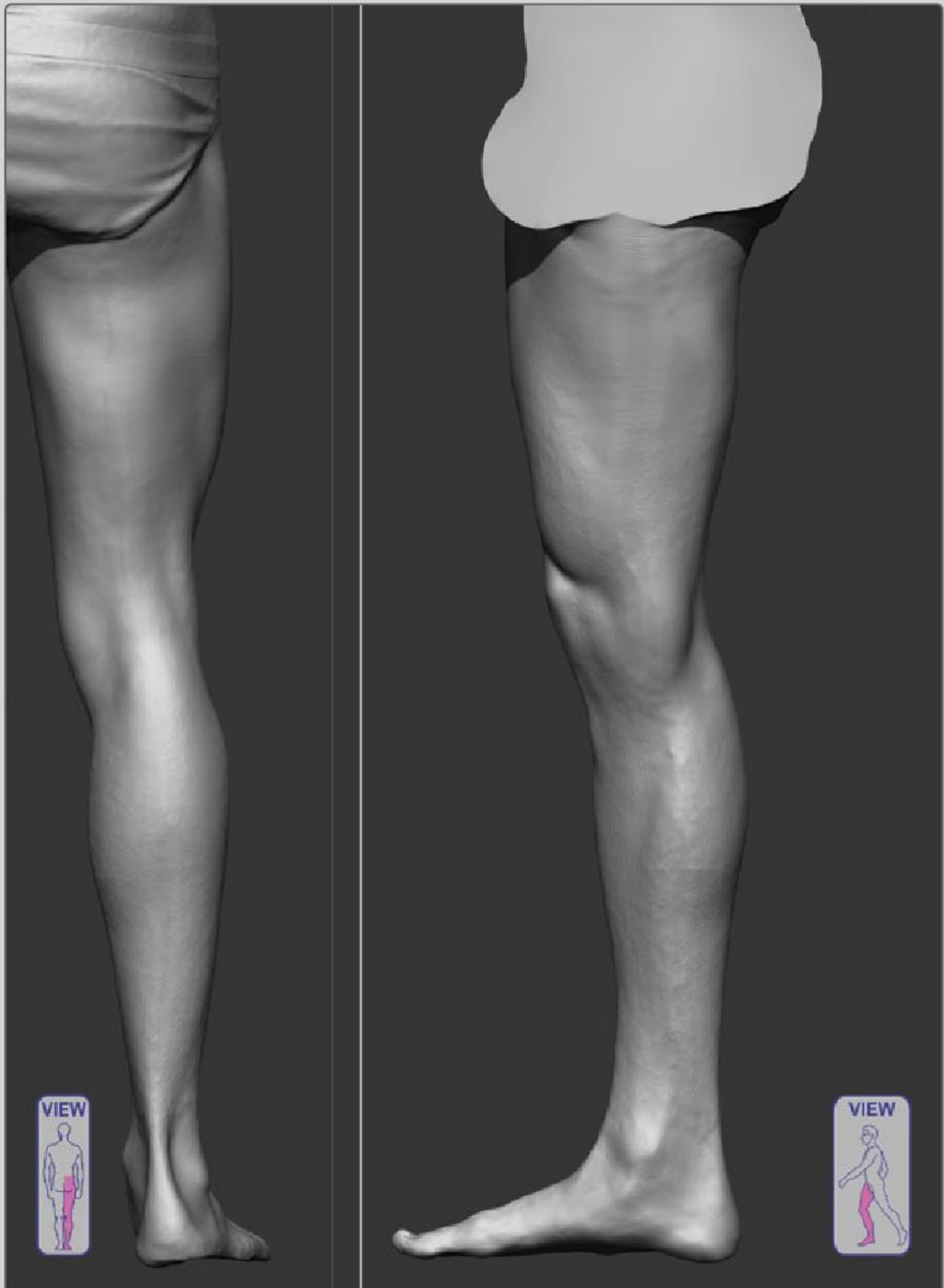


## 3D SCAN OF RIGHT LEG



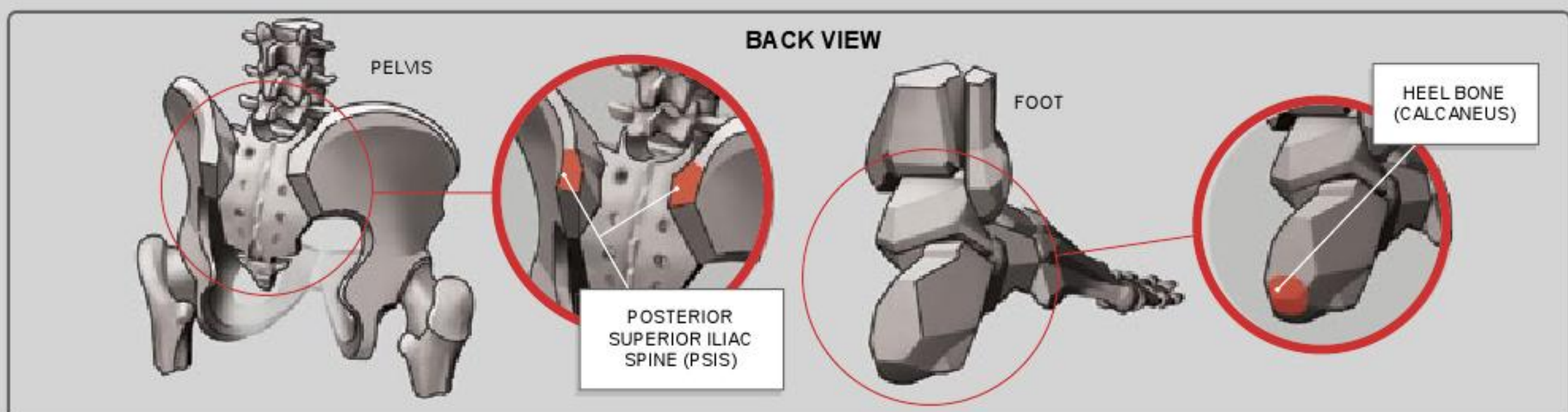
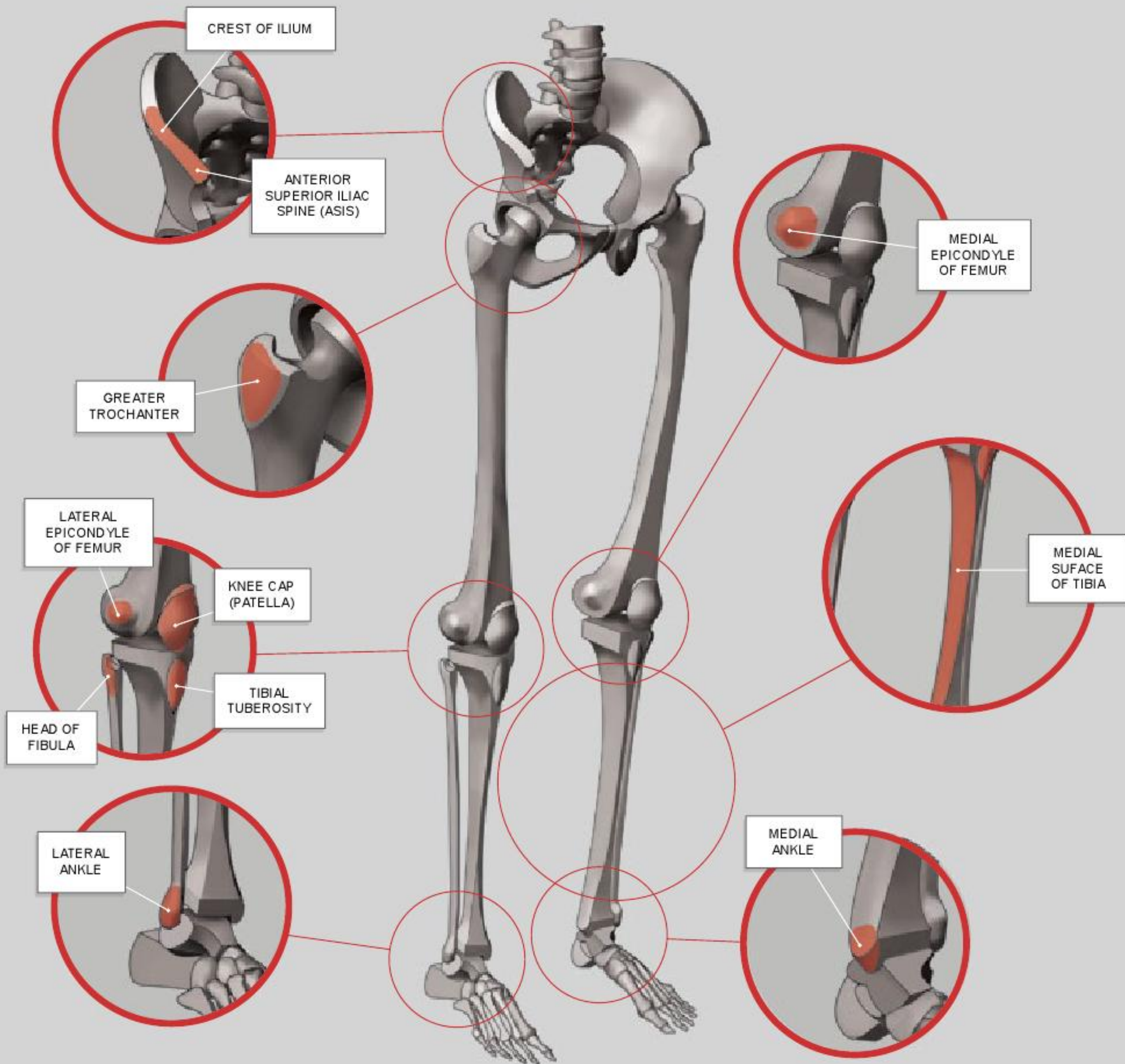


## 3D SCAN OF RIGHT LEG



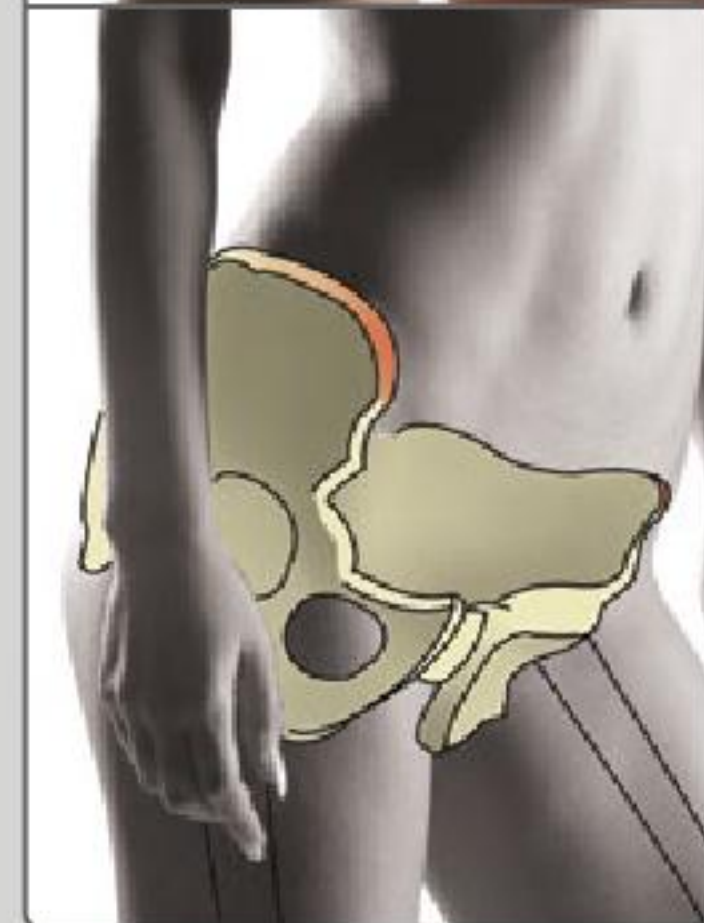
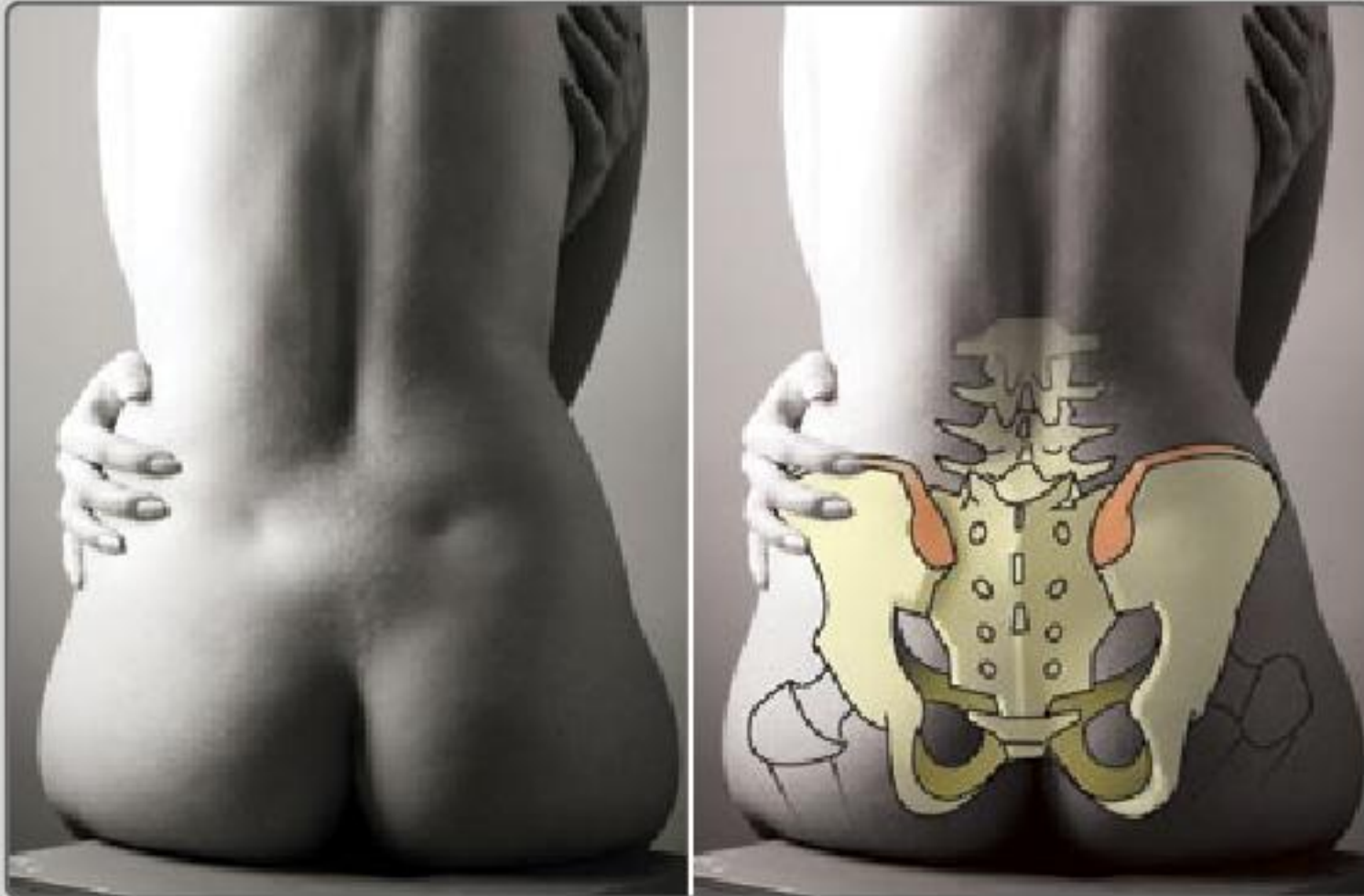


## BONY LANDMARKS OF LOWER LIMB





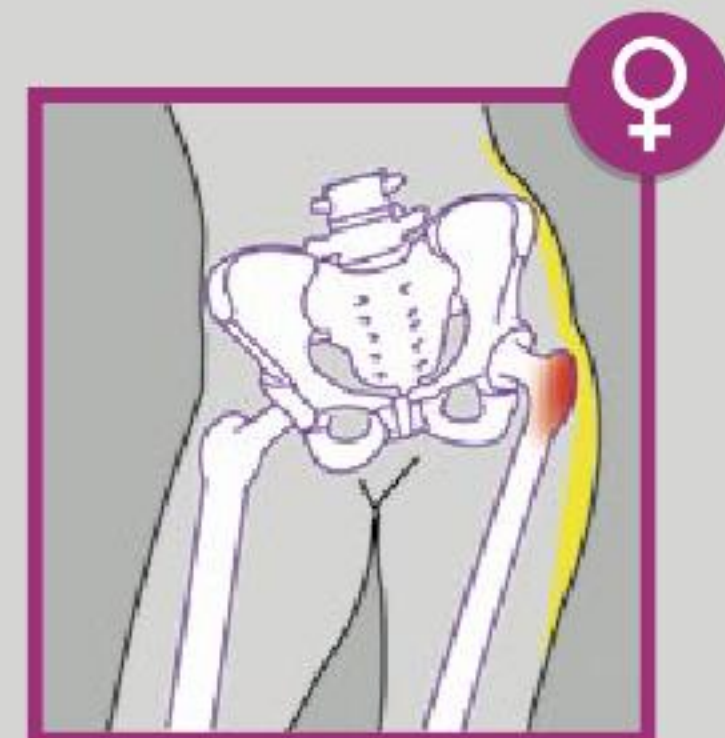
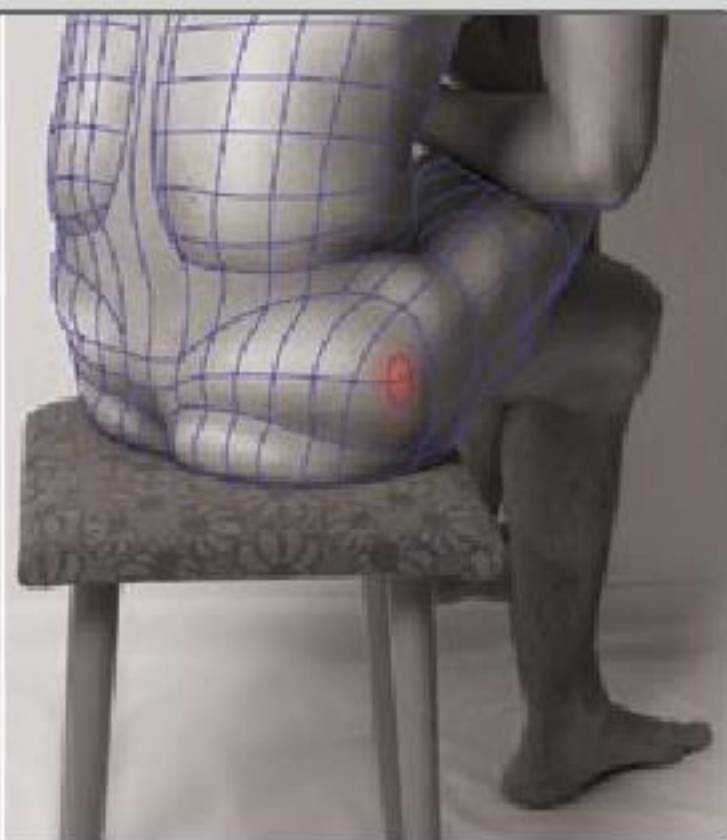
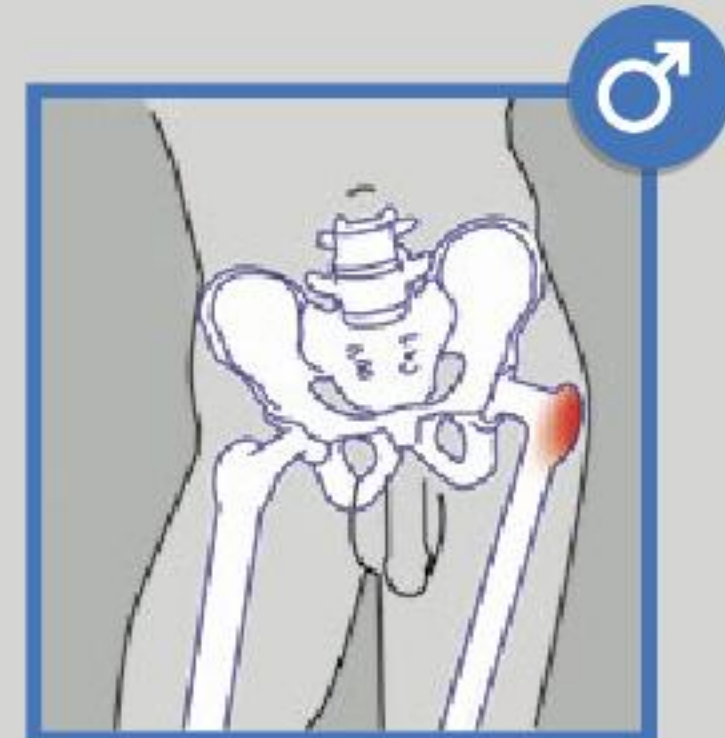
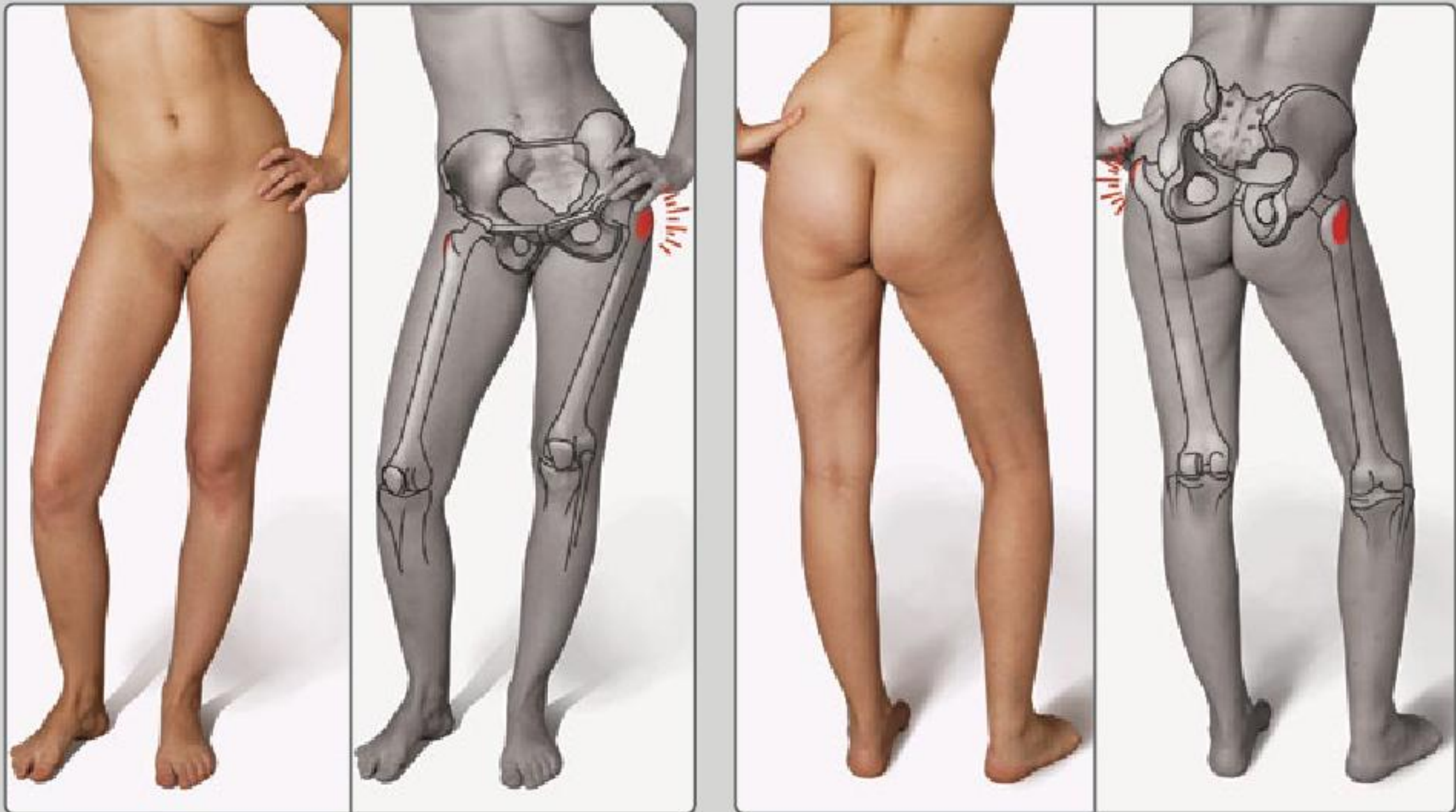
## BONY LANDMARKS OF PELVIS





## BONY LANDMARKS OF LOWER LIMB

### GREATER TROCHANTER



IN FEMALE HIPs, **SUBCUTANEOUS FAT** COVERS **GT** AT THE TOP OF FEMUR AND THEREFORE MAKES IT LESS PROMINENT.



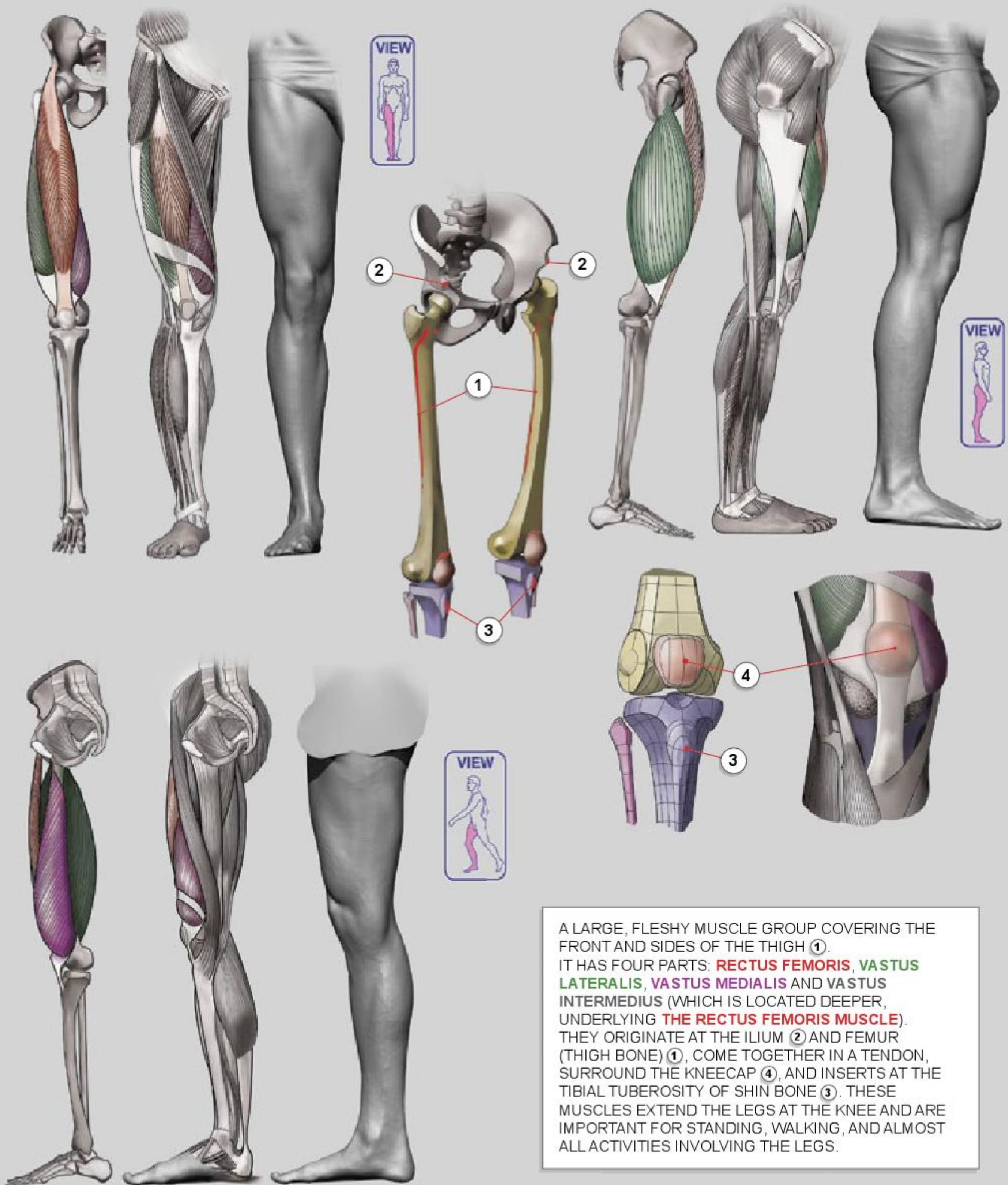
## MALE LEG SHAPES





## QUADS

(QUADRICEPS FEMORIS MUSCLE)

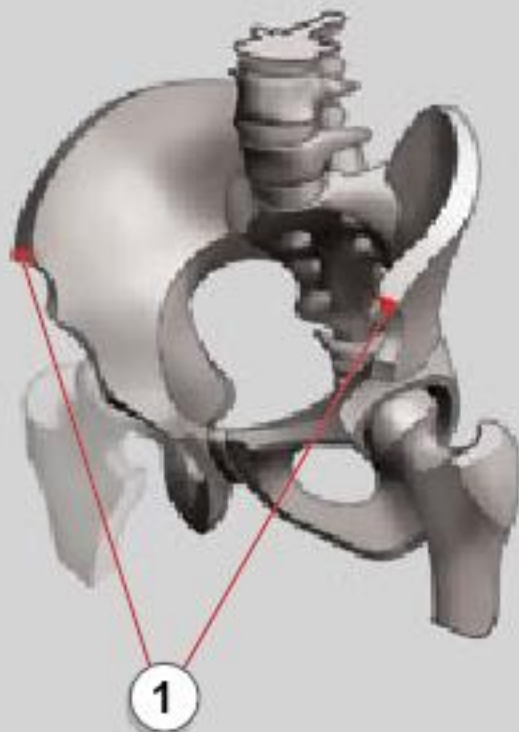


A LARGE, FLESHY MUSCLE GROUP COVERING THE FRONT AND SIDES OF THE THIGH ①. IT HAS FOUR PARTS: **RECTUS FEMORIS**, **VASTUS LATERALIS**, **VASTUS MEDIALIS** AND **VASTUS INTERMEDIUS** (WHICH IS LOCATED DEEPER, UNDERLYING **THE RECTUS FEMORIS MUSCLE**). THEY ORIGINATE AT THE ILIUM ② AND FEMUR (THIGH BONE) ①, COME TOGETHER IN A TENDON, SURROUND THE KNEECAP ④, AND INSERTS AT THE TIBIAL TUBEROSITY OF SHIN BONE ③. THESE MUSCLES EXTEND THE LEGS AT THE KNEE AND ARE IMPORTANT FOR STANDING, WALKING, AND ALMOST ALL ACTIVITIES INVOLVING THE LEGS.



# SARTORIUS MUSCLE

i

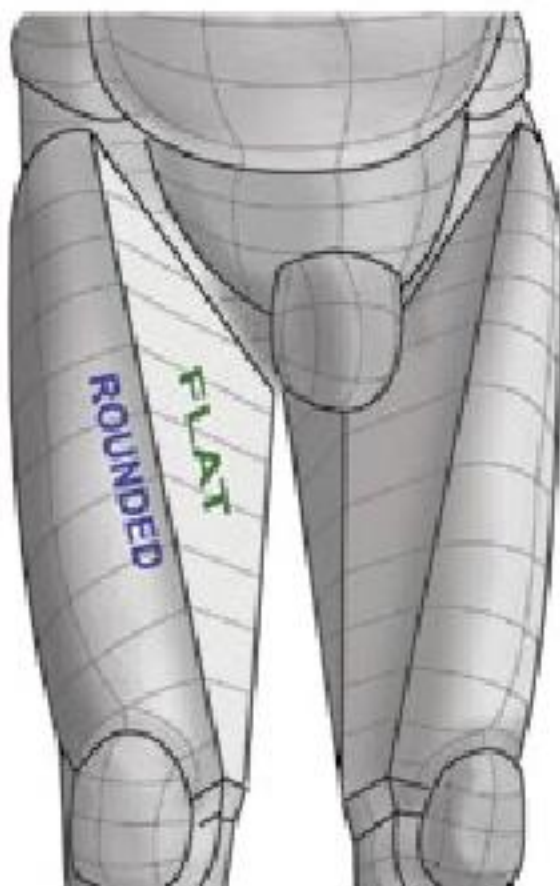


**ACTION:** FLEXION, ABDUCTION AND LATERAL ROTATION OF THE HIP, FLEXION OF THE KNEE

**ORIGIN:** 1 INFERIOR TO THE ANTERIOR SUPERIOR ILIAC SPINE

**INSERTION:** 2 ANTEROMEDIAL SURFACE OF THE UPPER TIBIA

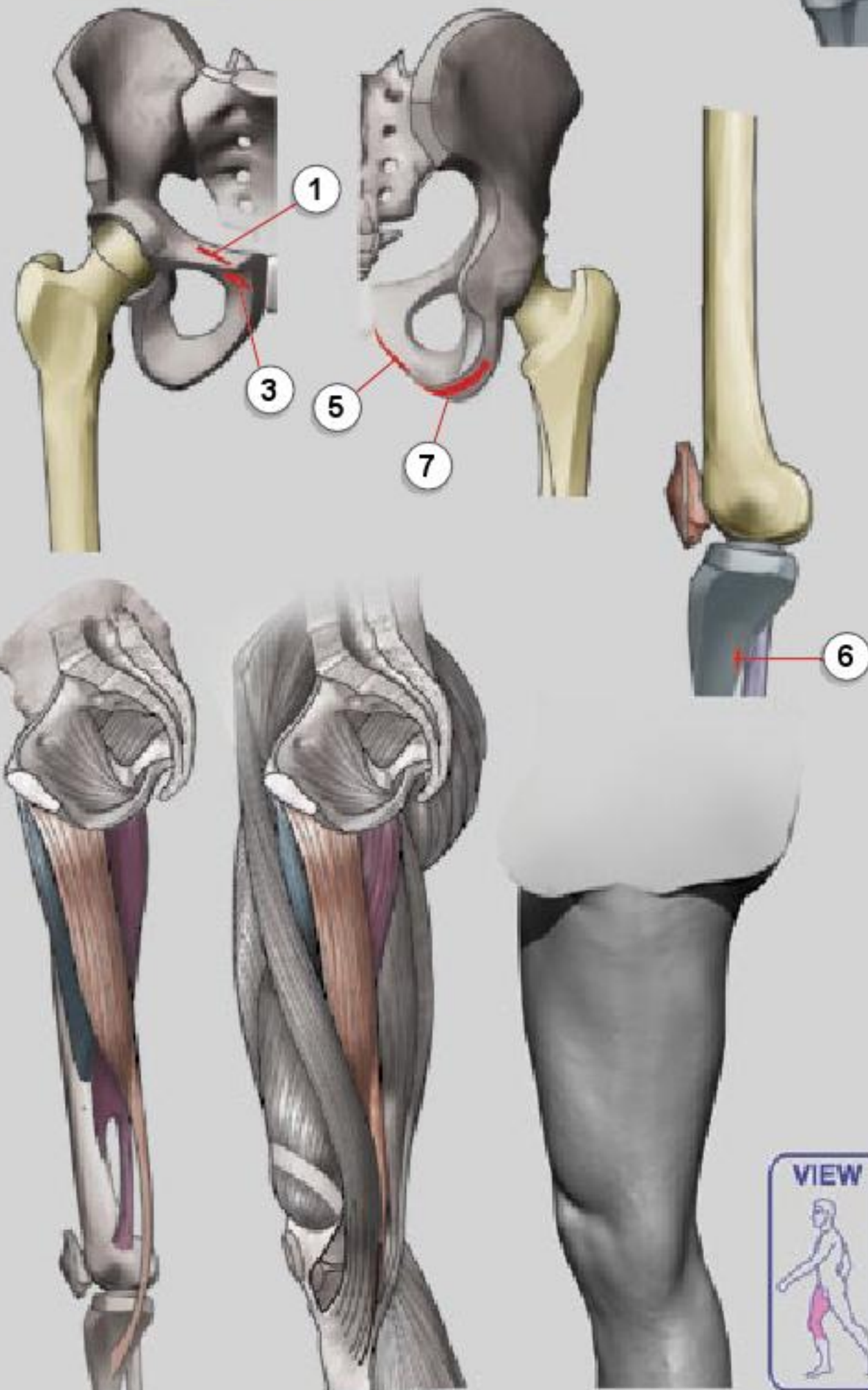
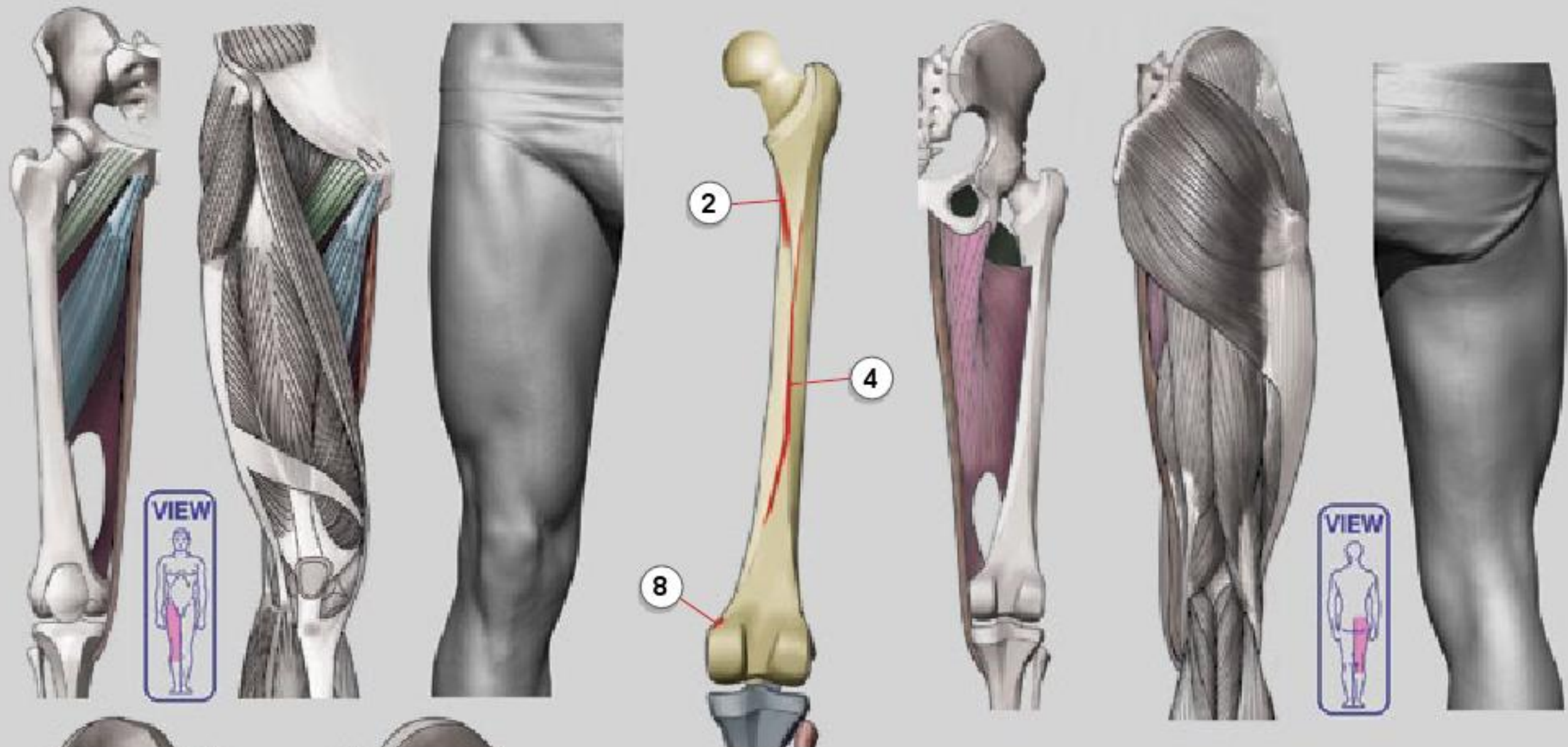
SARTORIUS MUSCLE DIVIDES THIGH INTO TWO PLANES





# PECTINEUS, ADDUCTOR LONGUS, GRACILIS, AND ADDUCTOR MAGNUS

(ADDUCTOR MUSCLES OF THE HIP)



## PECTINEUS

|                   |                                    |
|-------------------|------------------------------------|
| <b>ACTION:</b>    | THIGH FLEXION, ADDUCTION           |
| <b>ORIGIN:</b>    | 1 PECTINEAL LINE OF THE PUBIC BONE |
| <b>INSERTION:</b> | 2 PECTINEAL LINE OF THE FEMUR      |

## ADDUCTOR LONGUS

|                   |                                         |
|-------------------|-----------------------------------------|
| <b>ACTION:</b>    | ADDUCTION OF HIP, FLEXION OF HIP JOINT  |
| <b>ORIGIN:</b>    | 3 PUBIC BODY JUST BELOW THE PUBIC CREST |
| <b>INSERTION:</b> | 4 MIDDLE THIRD OF LINEA ASPERA          |

## GRACILIS

|                   |                                                                |
|-------------------|----------------------------------------------------------------|
| <b>ACTION:</b>    | FLEXES, MEDIANLY ROTATES, AND ADDUCTS THE HIP, FLEXES THE KNEE |
| <b>ORIGIN:</b>    | 5 ISCHIO-PUBIC RAMUS                                           |
| <b>INSERTION:</b> | 6 PES ANSERINUS                                                |

## ADDUCTOR MAGNUS

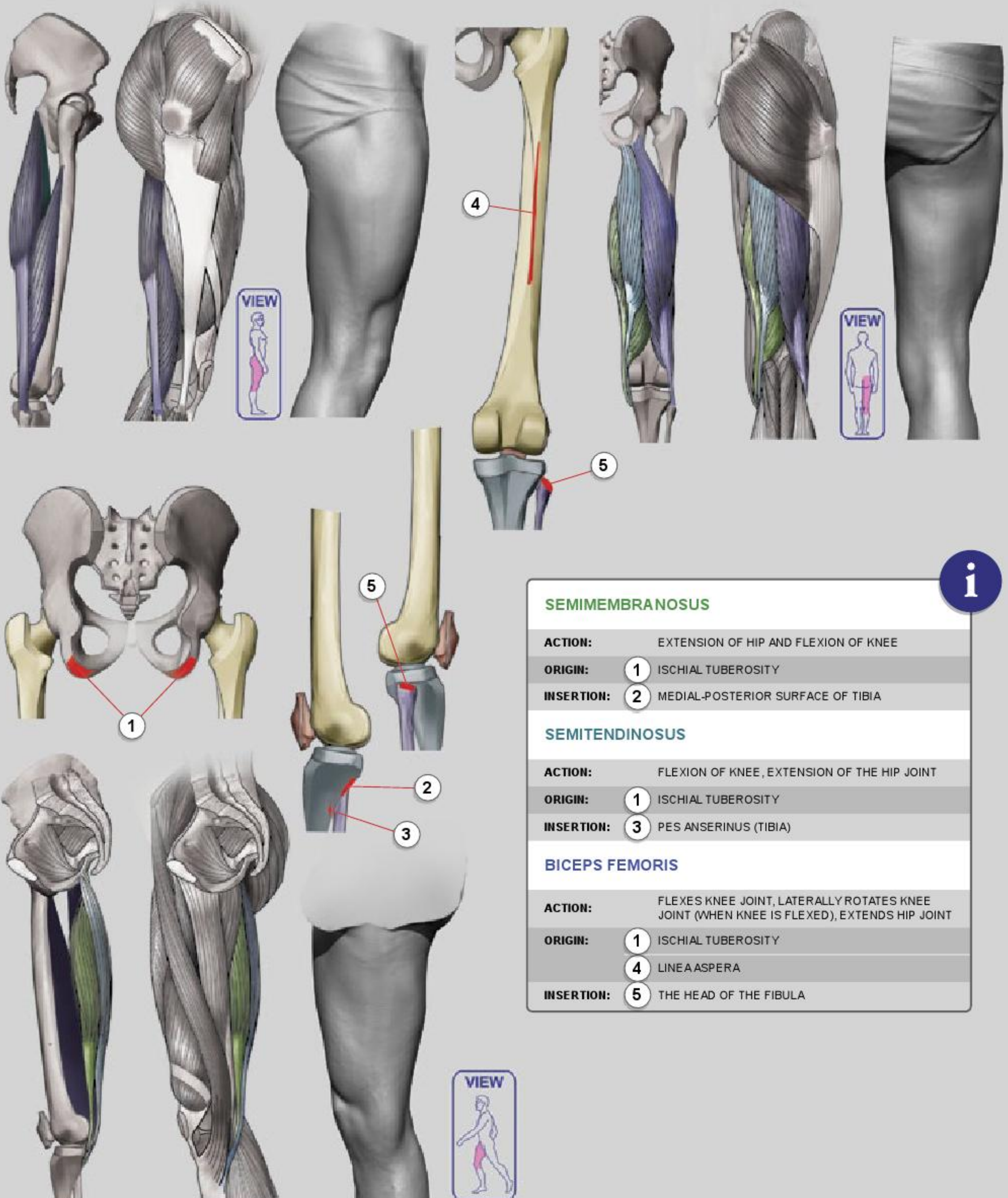
|                   |                                                |
|-------------------|------------------------------------------------|
| <b>ACTION:</b>    | ADDUCTION, FLEXION AND EXTENSION OF HIP        |
| <b>ORIGIN:</b>    | 7 PUBIS, TUBEROSITY OF THE ISCHIUM             |
| <b>INSERTION:</b> | 4 LINEA ASPERA<br>8 ADDUCTOR TUBERCLE OF FEMUR |



## HAMSTRINGS

(FLEXORS OF THE THIGH)

### SEMITENDINOSUS, SEMIMEMBRANOSUS AND BICEPS FEMORIS MUSCLES



#### SEMIMEMBRANOSUS

**ACTION:** EXTENSION OF HIP AND FLEXION OF KNEE

**ORIGIN:** 1 ISCHIAL TUBEROSITY

**INSERTION:** 2 MEDIAL-POSTERIOR SURFACE OF TIBIA

#### SEMITENDINOSUS

**ACTION:** FLEXION OF KNEE, EXTENSION OF THE HIP JOINT

**ORIGIN:** 1 ISCHIAL TUBEROSITY

**INSERTION:** 3 PES ANSERINUS (TIBIA)

#### BICEPS FEMORIS

**ACTION:** FLEXES KNEE JOINT, LATERALLY ROTATES KNEE JOINT (WHEN KNEE IS FLEXED), EXTENDS HIP JOINT

**ORIGIN:** 1 ISCHIAL TUBEROSITY

4 LINEA ASPERA

**INSERTION:** 5 THE HEAD OF THE FIBULA



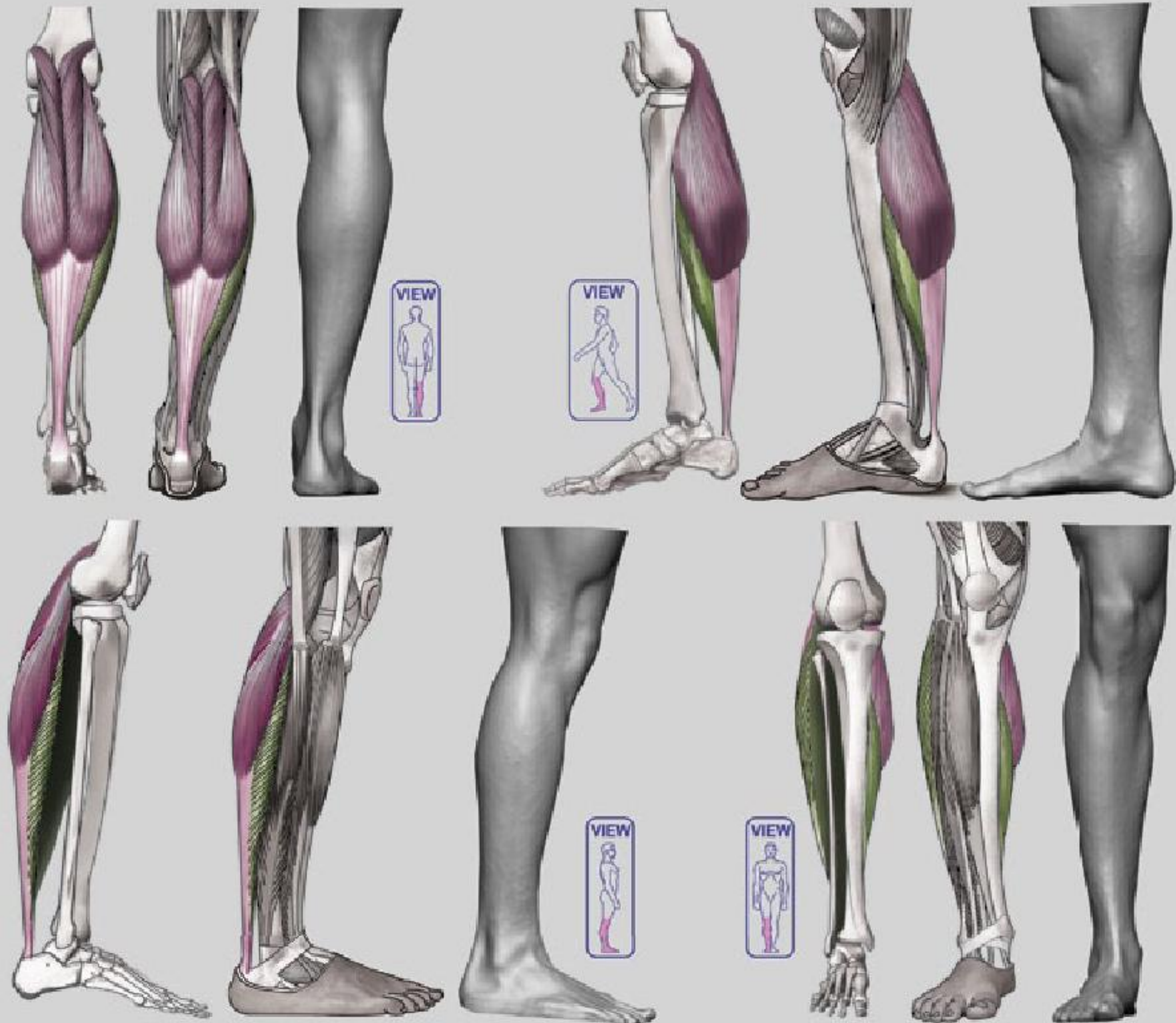
## CALVES



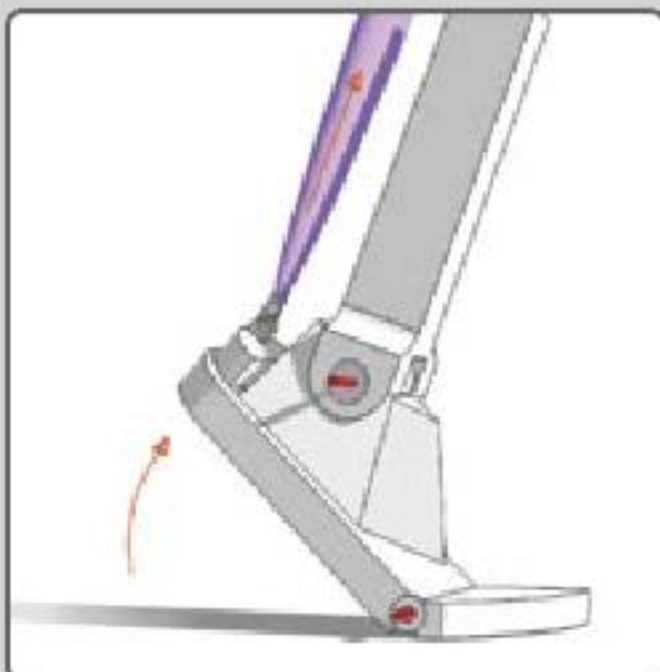


## THE CALF

(GASTROCNEMIUS AND SOLEUS MUSCLES)

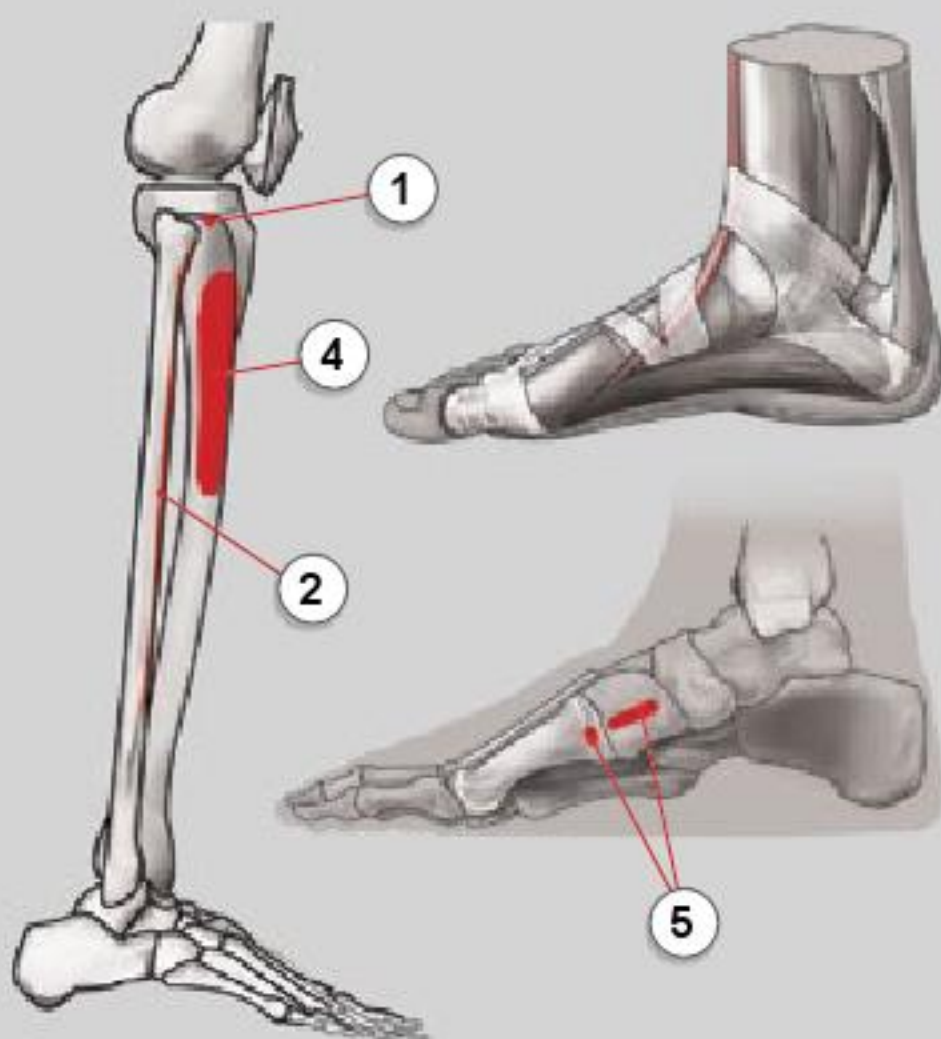
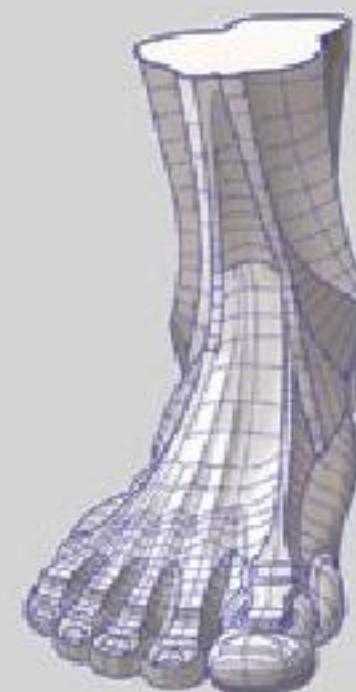
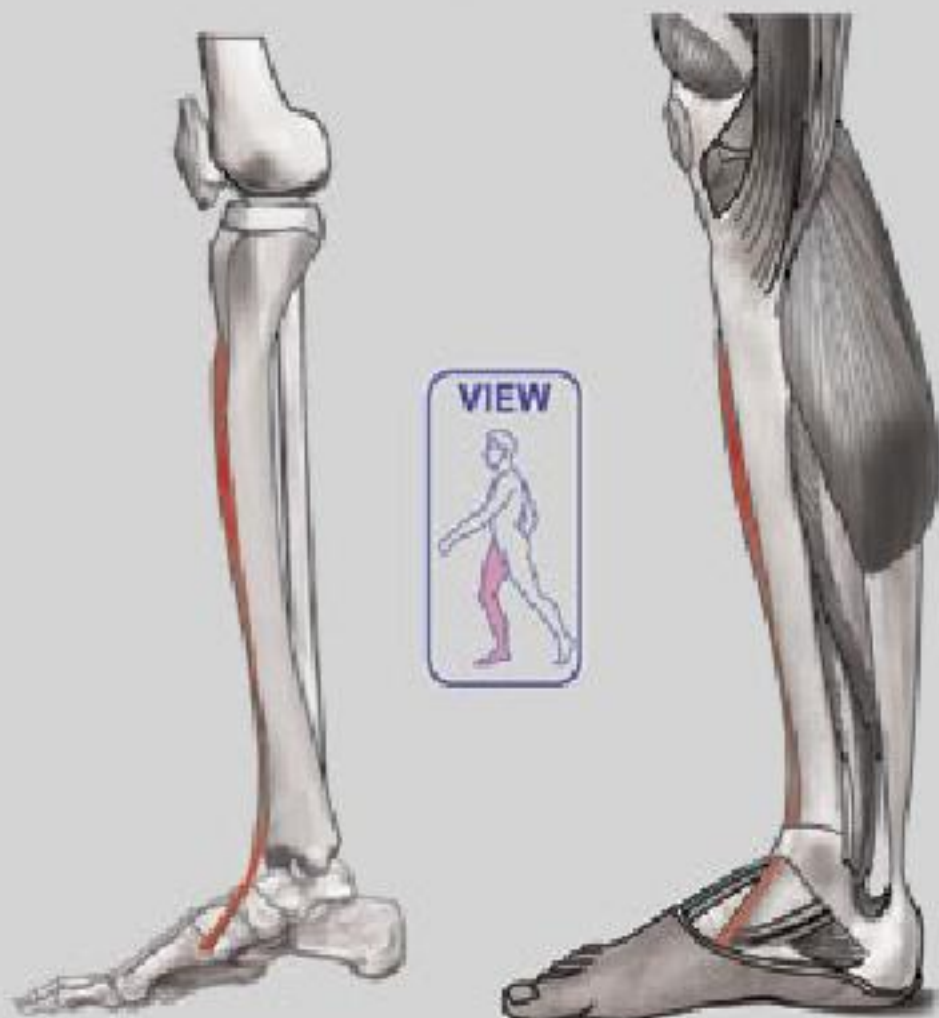
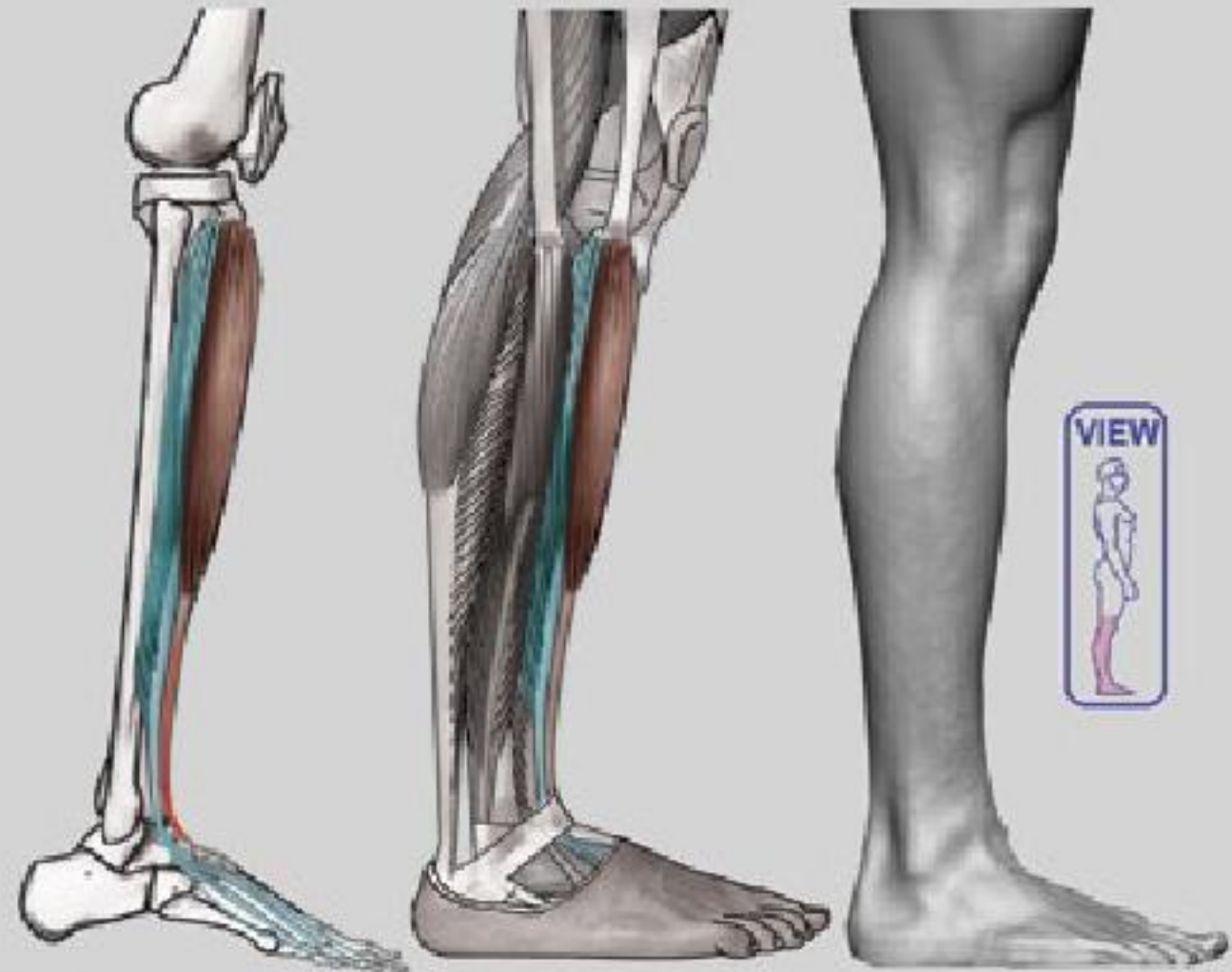


**GASTROCNEMIUS** MUSCLE IS THE LARGER CALF MUSCLE, FORMING A BULGE VISIBLE BENEATH THE SKIN. **THE GASTROCNEMIUS** HAS TWO PARTS OR "HEADS", WHICH TOGETHER CREATE ITS DIAMOND SHAPE. **THE SOLEUS** IS A SMALLER, FLAT MUSCLE THAT LIES UNDERNEATH THE **GASTROCNEMIUS** MUSCLE. CONNECTIVE TISSUE AT THE BOTTOM OF THE CALF MUSCLE MERGES WITH THE ACHILLES TENDON. THE ACHILLES TENDON INSERTS INTO THE HEEL BONE (CALCANEUS).





## EXTENSOR DIGITORUM LONGUS AND **TIBIALIS ANTERIOR** MUSCLES



### EXTENSOR DIGITORUM LONGUS

|                   |                                                                    |
|-------------------|--------------------------------------------------------------------|
| <b>ACTION:</b>    | EXTENSION OF TOES AND DORSIFLEXION OF ANKLE                        |
| <b>ORIGIN:</b>    | 1 ANTERIOR LATERAL CONDYLE OF TIBIA                                |
|                   | 2 ANTERIOR SHAFT OF FIBULA                                         |
| <b>INSERTION:</b> | 3 DORSAL SURFACE: MIDDLE AND DISTAL PHALANXES OF DIGITS 2, 3, 4, 5 |

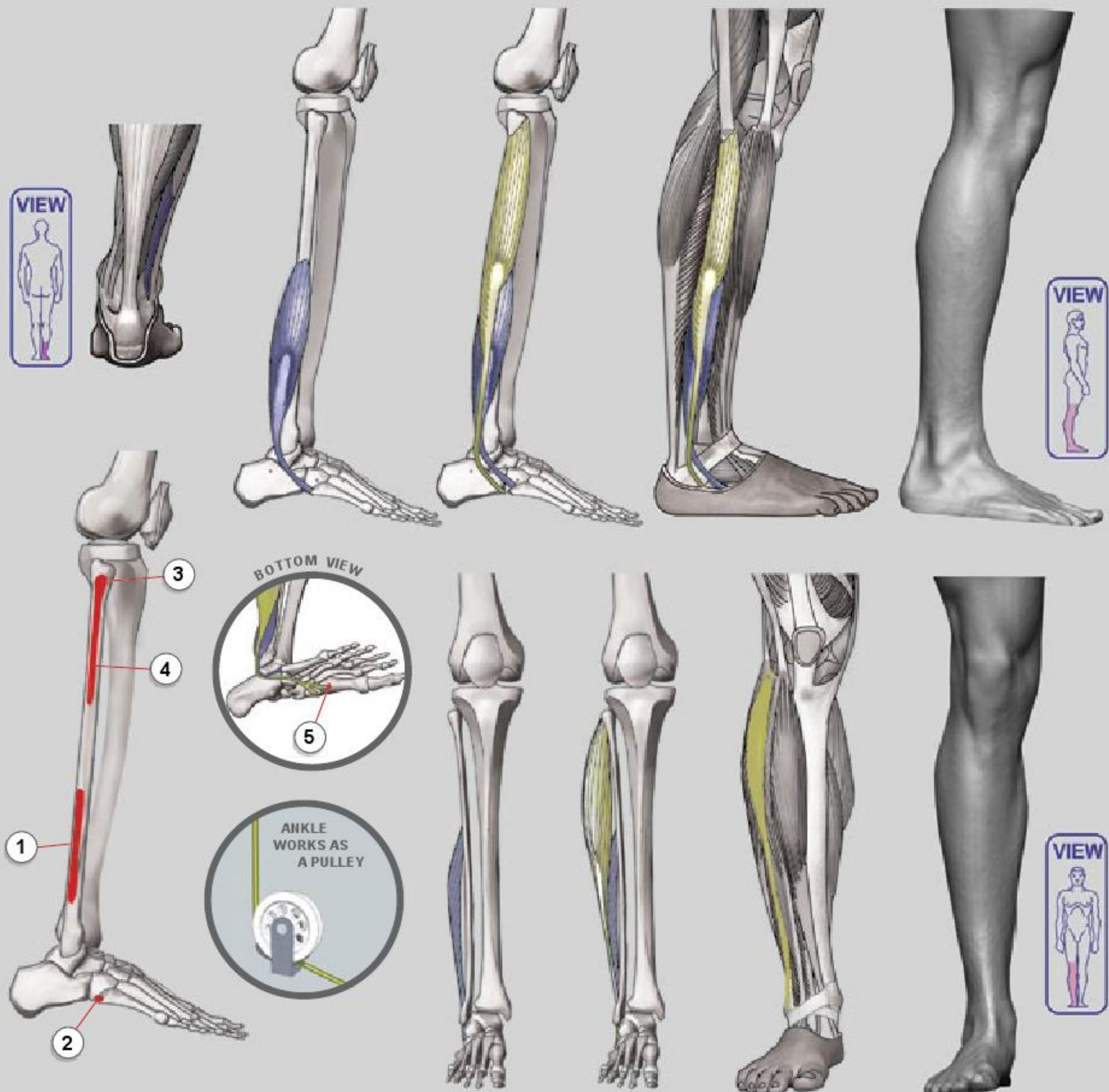
### **TIBIALIS ANTERIOR**

|                   |                                         |
|-------------------|-----------------------------------------|
| <b>ACTION:</b>    | DORSIFLEXION AND INVERSION OF THE FOOT  |
| <b>ORIGIN:</b>    | 4 BODY OF TIBIA                         |
| <b>INSERTION:</b> | 5 MEDIAL CUNEIFORM AND FIRST METATARSAL |





## PERONEUS BREVIS AND PERONEUS LONGUS MUSCLES



### PERONEUS BREVIS

|                   |                                       |
|-------------------|---------------------------------------|
| <b>ACTIONS:</b>   | EVERTS AND PLANTAR FLEXES THE FOOT    |
| <b>ORIGIN:</b>    | 1 LOWER 2/3 OF THE LATERAL FIBULA     |
| <b>INSERTION:</b> | 2 ENLARGED BASE OF THE 5TH METATARSAL |

### PERONEUS LONGUS

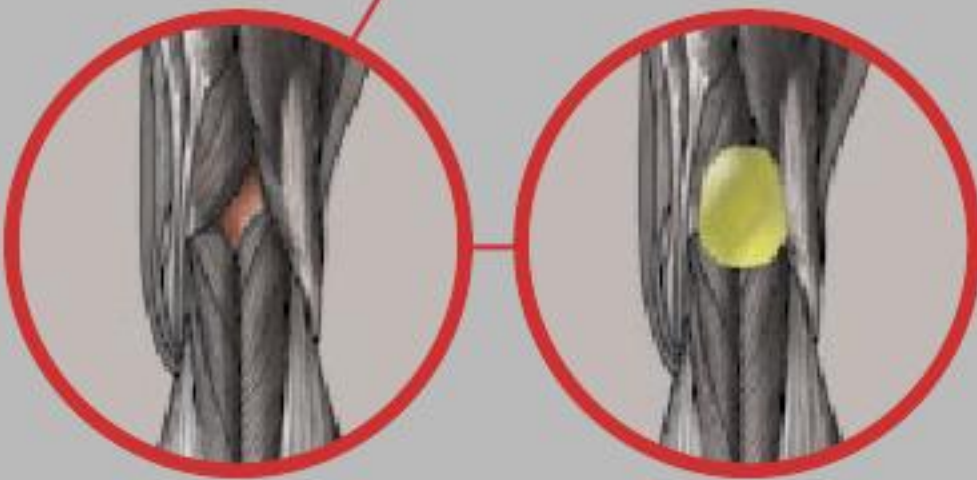
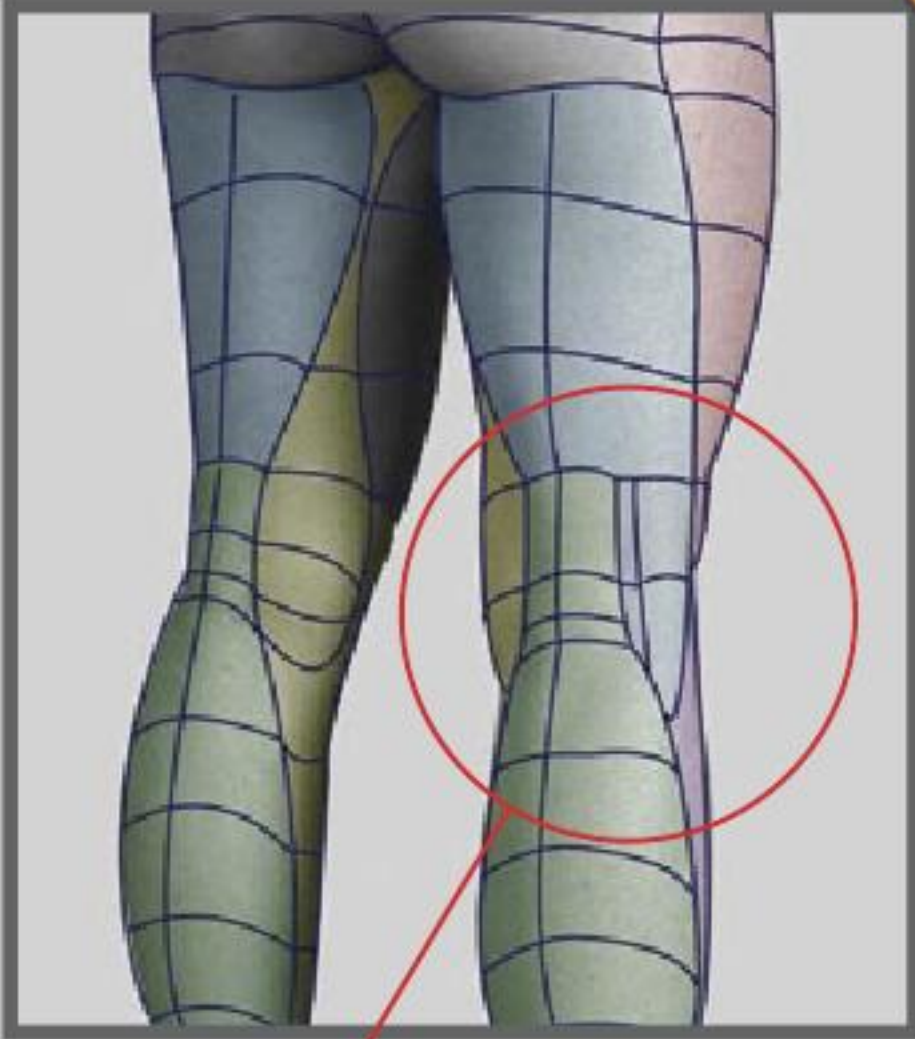
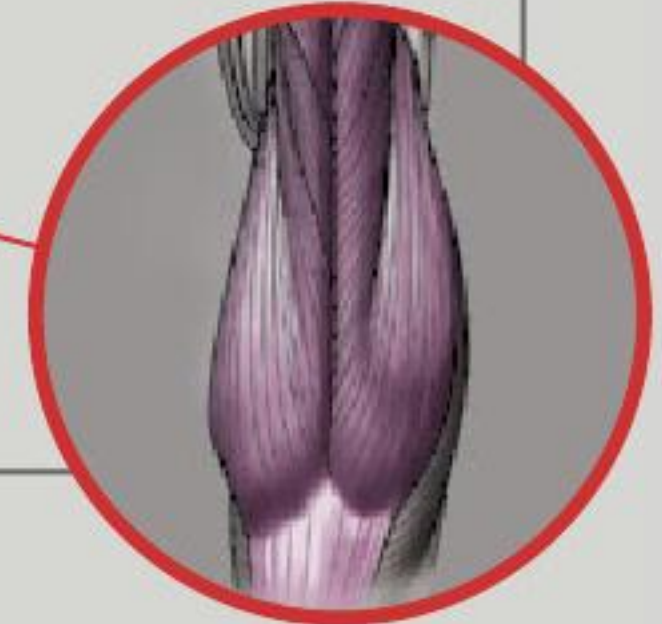
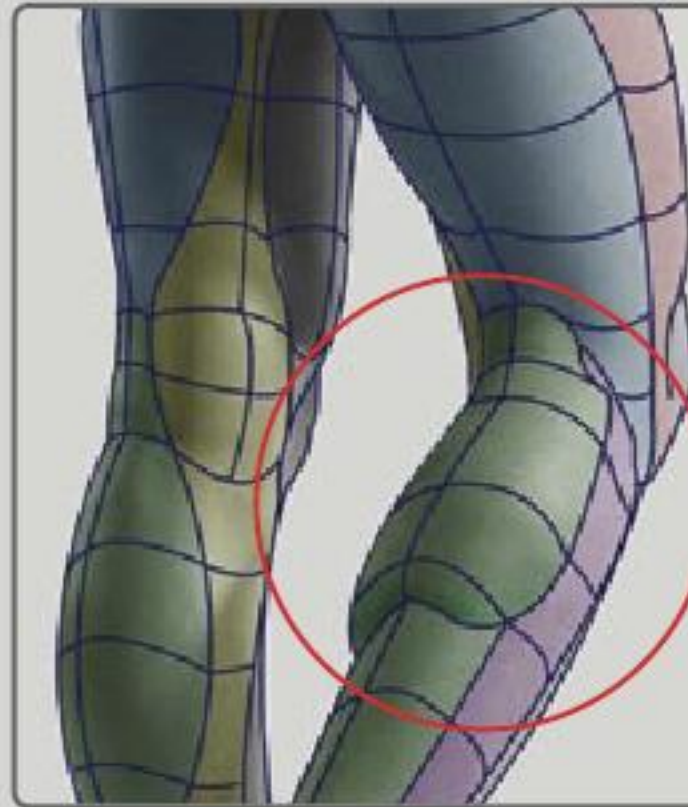
|                   |                                                                                  |
|-------------------|----------------------------------------------------------------------------------|
| <b>ACTIONS:</b>   | EVERTS AND PLANTAR FLEXES THE FOOT, MAINTAINS THE ARCH OF THE FOOT               |
| <b>ORIGIN:</b>    | 3 HEAD OF FIBULA                                                                 |
|                   | 4 UPPER 2/3 OF THE SHAFT OF FIBULA                                               |
| <b>INSERTION:</b> | 5 UNDER THE FOOT INTO THE BASE OF THE 1st. METATARSAL BONE, AND MEDIAL CUNEIFORM |



## TIPS FOR BACKSIDE OF LEGS



WHEN THE LEG IS BENT, CALF MUSCLES (GASTROCNEMIUS AND SOLEUS) ARE MORE PRONOUNCED!



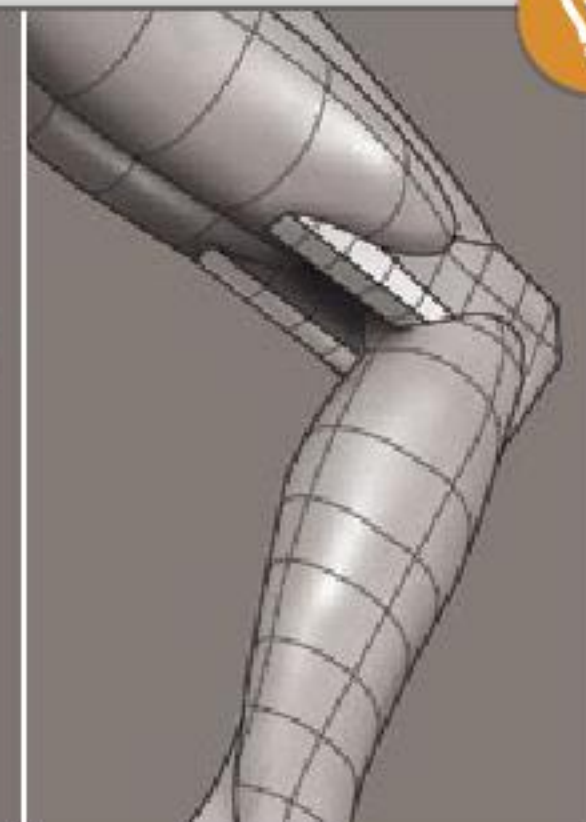
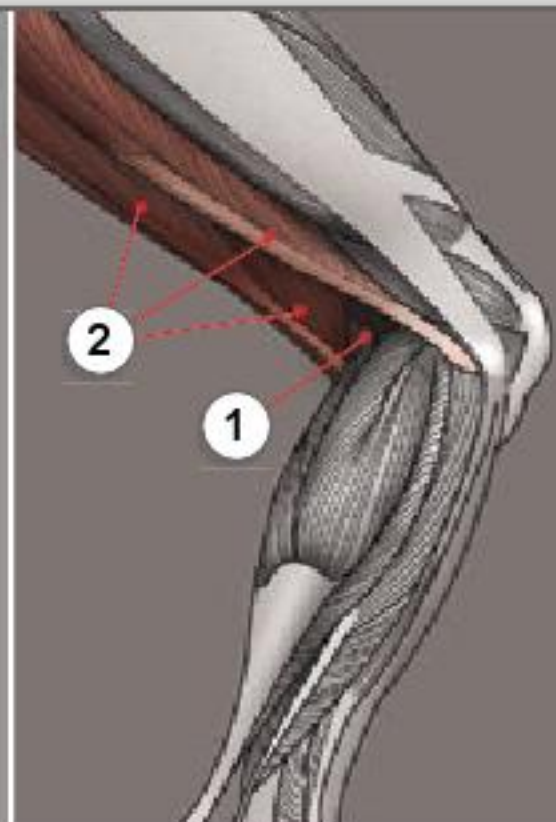
HERE, IN THE MUSCLE VIEW, THE BACK OF THE KNEE IS A SHALLOW DEPRESSION. BUT IN REAL LIFE, WHEN THE LEG IS STRAIGHT, THIS AREA POPS OUTWARD. THIS IS BECAUSE OF A FAT PAD LOCATED RIGHT ON TOP OF THE POPLITEAL FOSSA.



AS THE LEG IS BENT FURTHER, THE DEPRESSION, CALLED THE POPLITEAL FOSSA (THE KNEE PIT), BECOMES DEEPER.

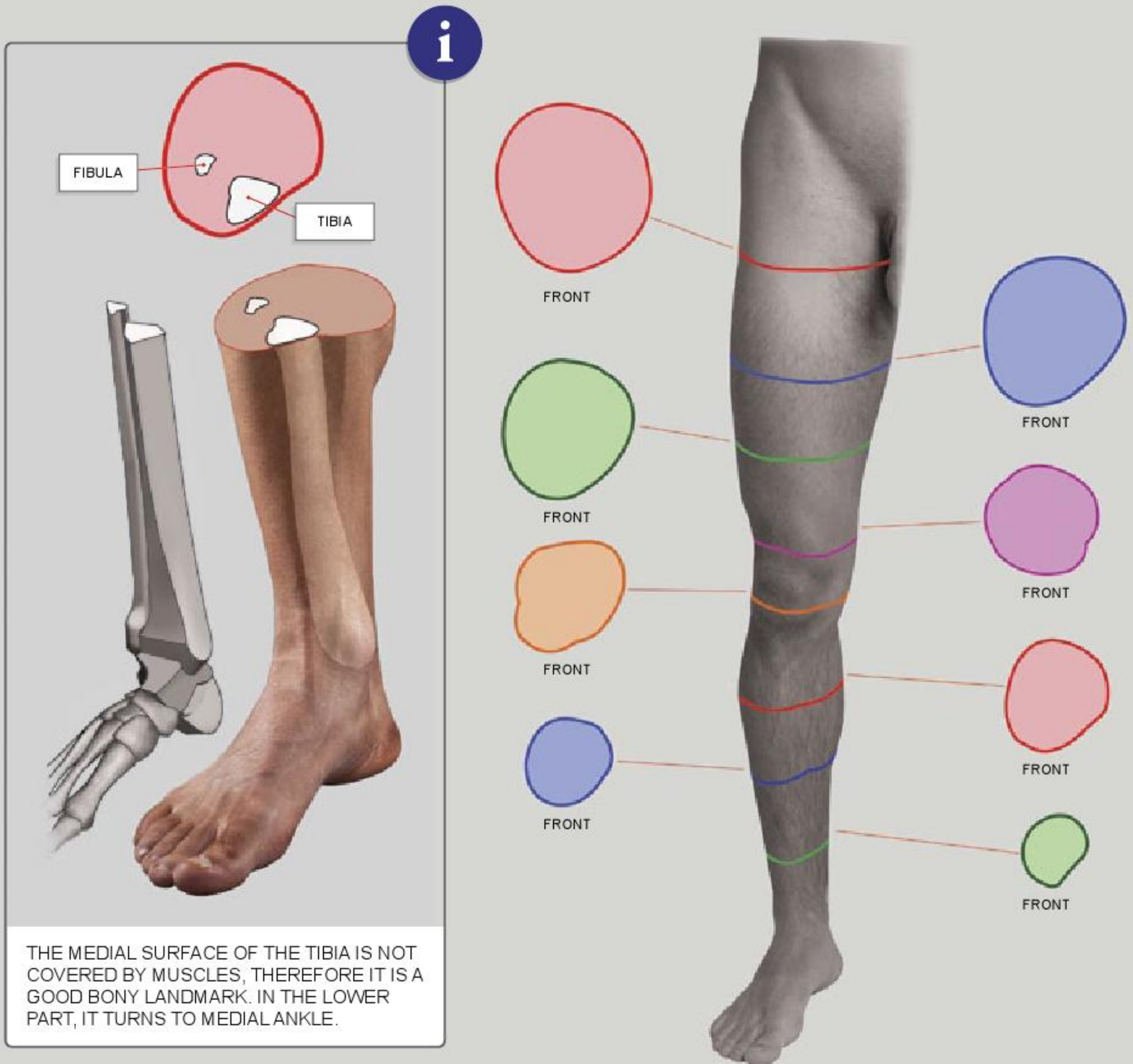
1 FOSSA (THE KNEE PIT) BECOMES PROMINENT

2 HAMSTRING MUSCLES



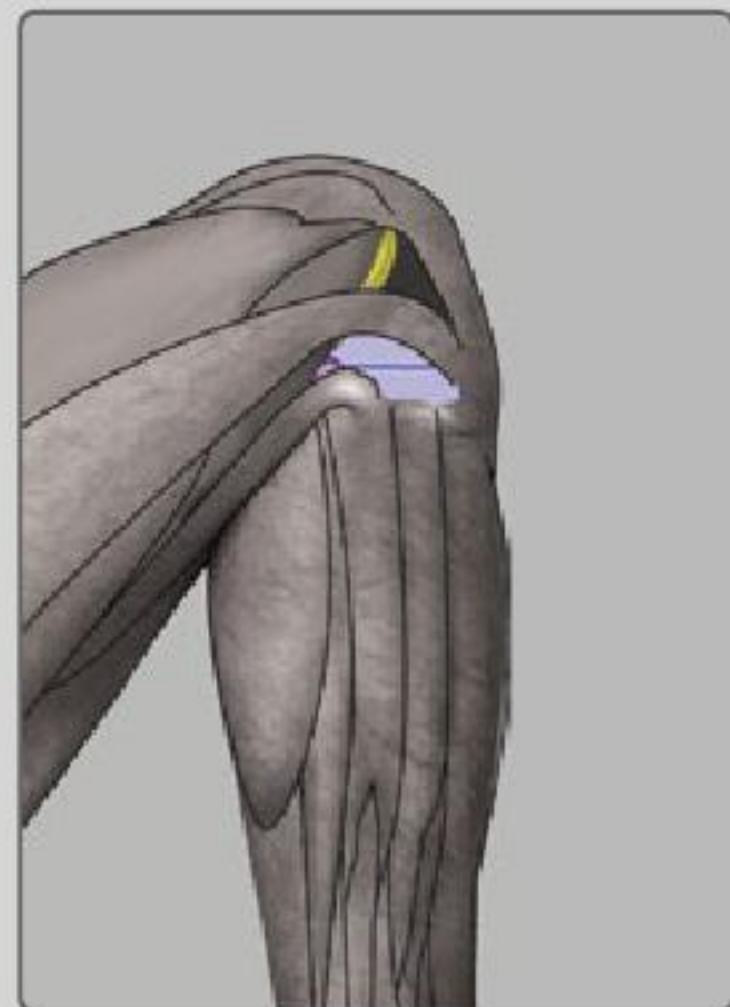
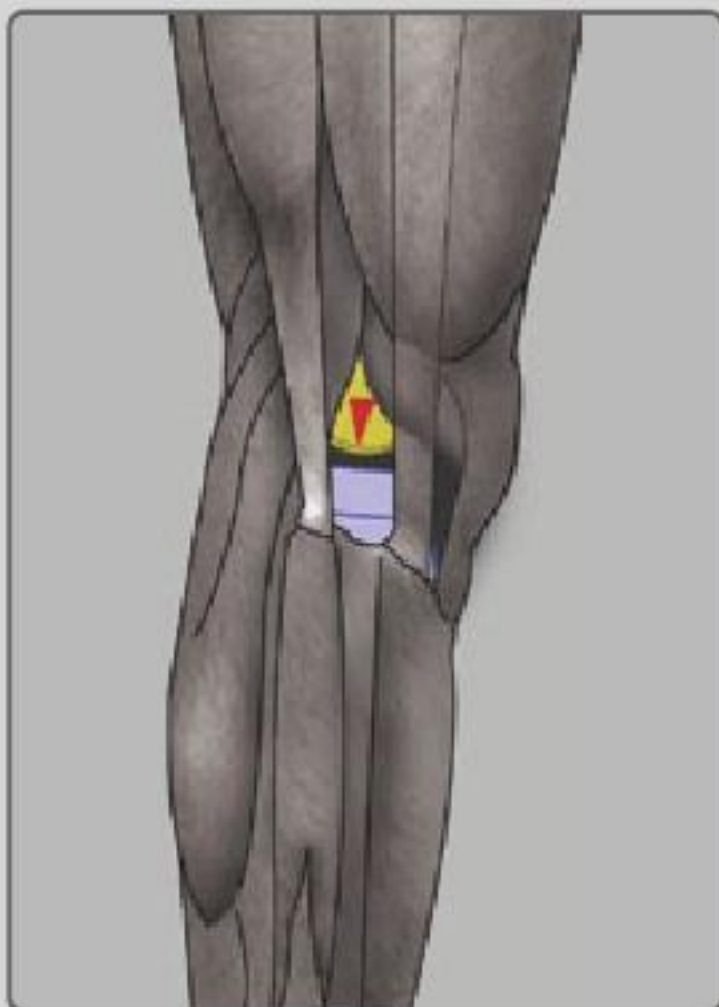
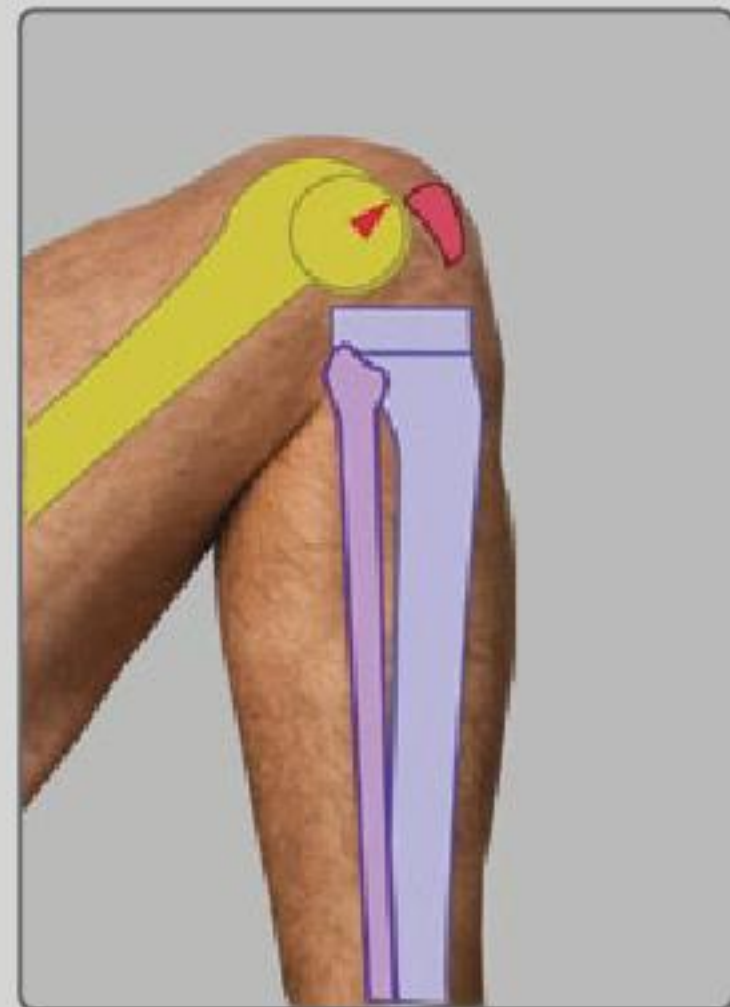
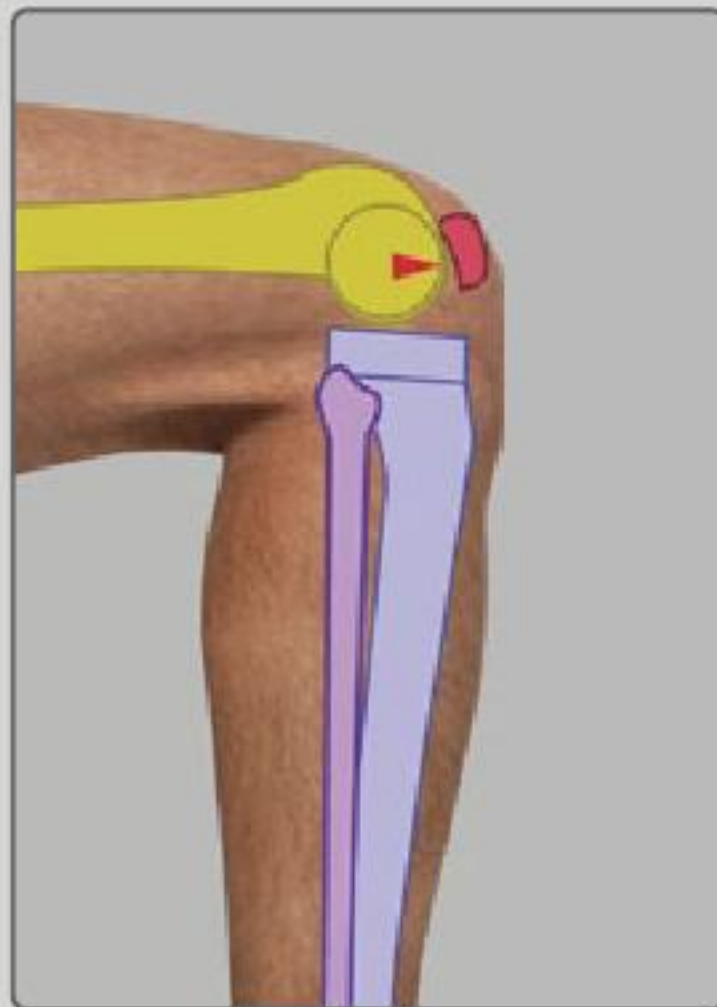
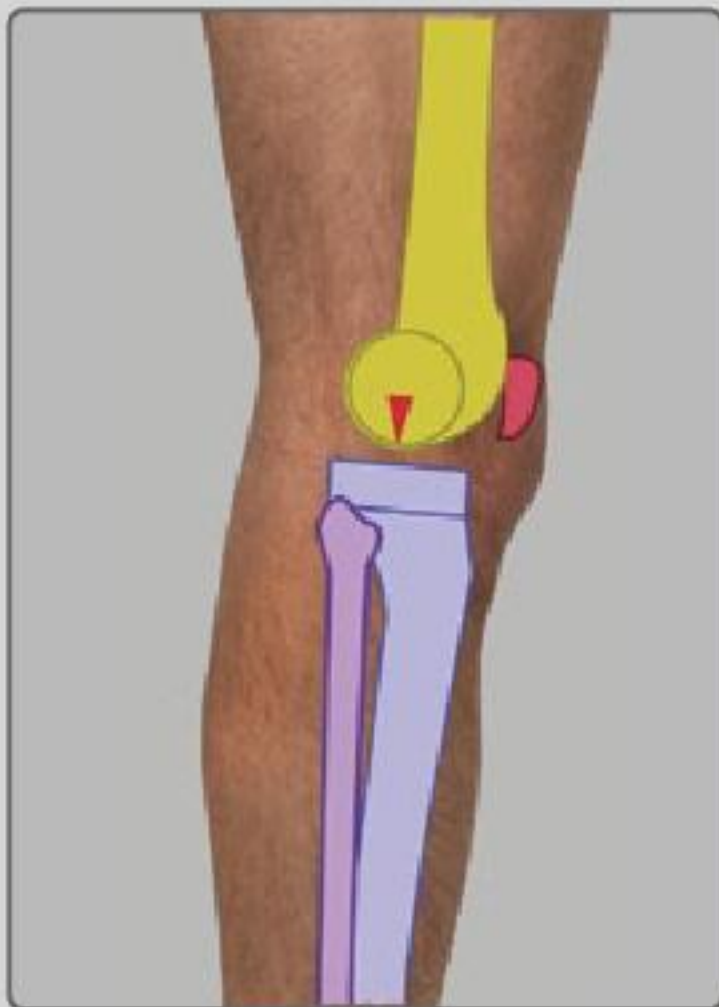


## CROSS SECTION OF THE LOWER LIMB





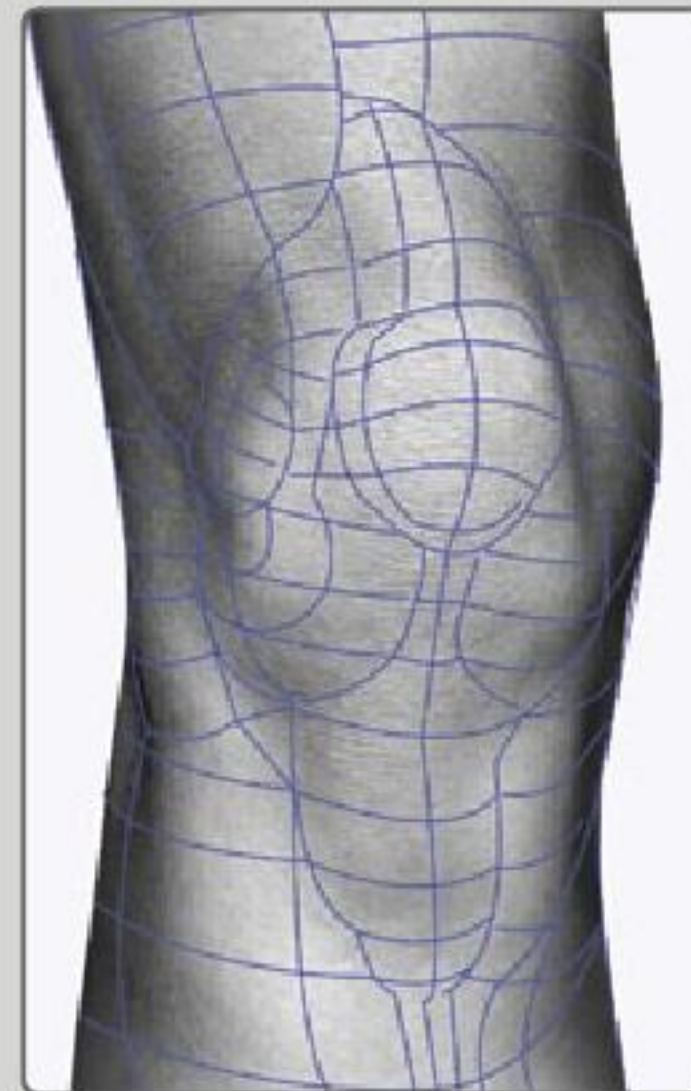
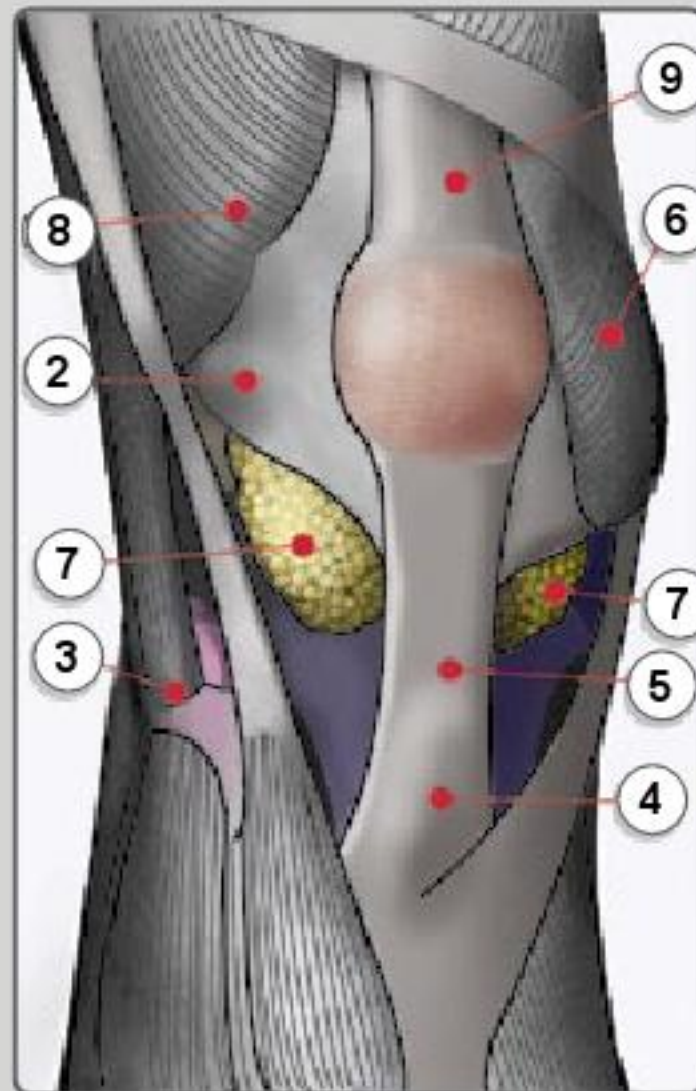
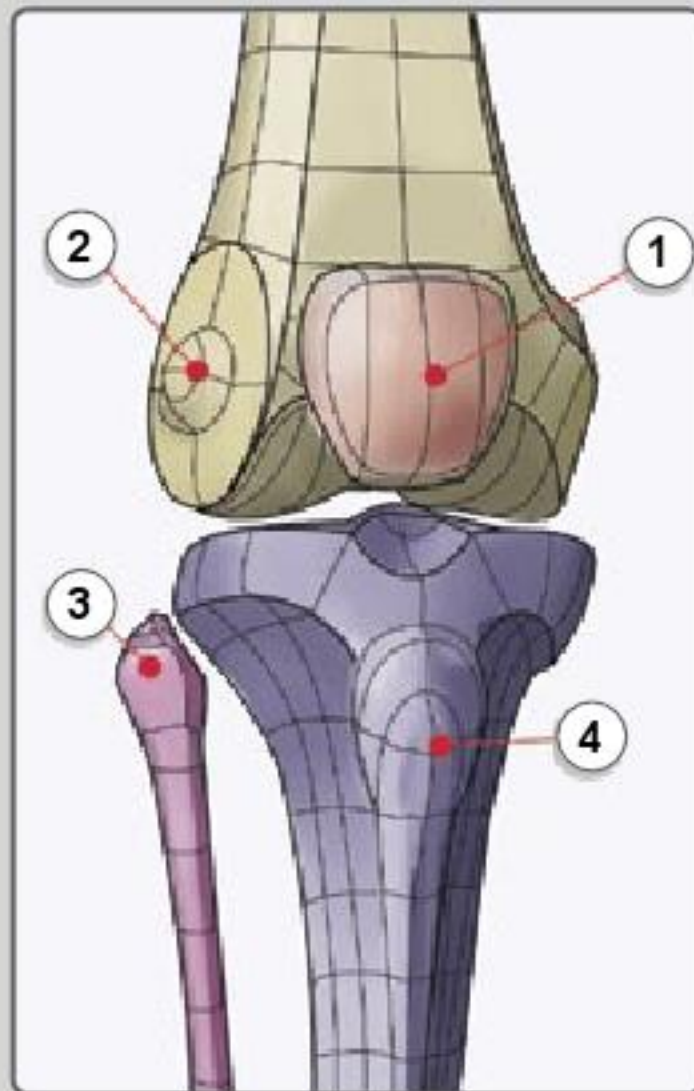
## KNEE MECHANICS





## THE KNEE

(WHAT ARE THESE BUMPS?)



1 KNEE CAP (PATELLA)

2 LATERAL EPICONDYLE OF FEMUR

3 HEAD OF FIBULA

4 TIBIAL TUBEROSITY

5 PATELLAR LIGAMENT

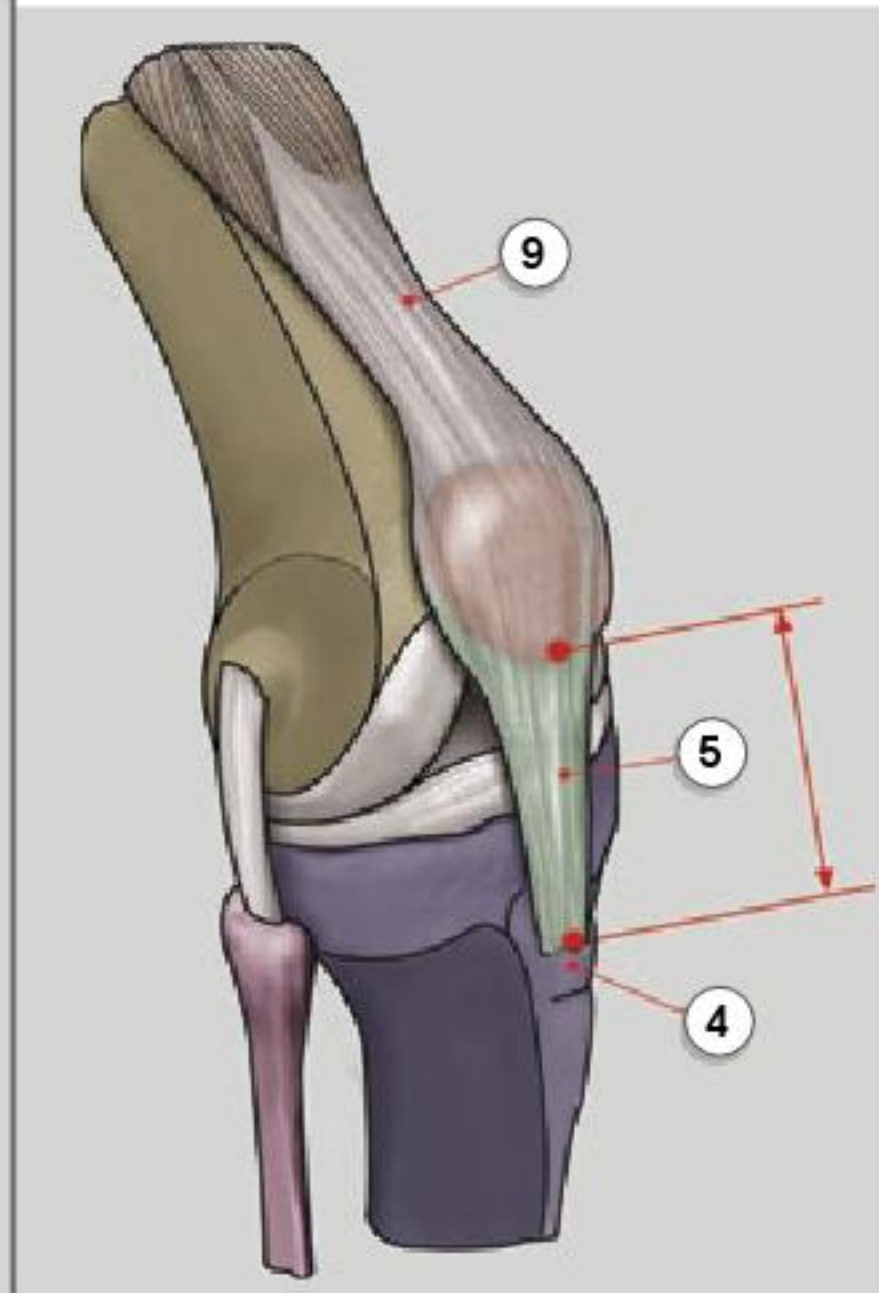
6 VASTUS MEDIALIS

7 INFRAPATELLAR FAT PAD

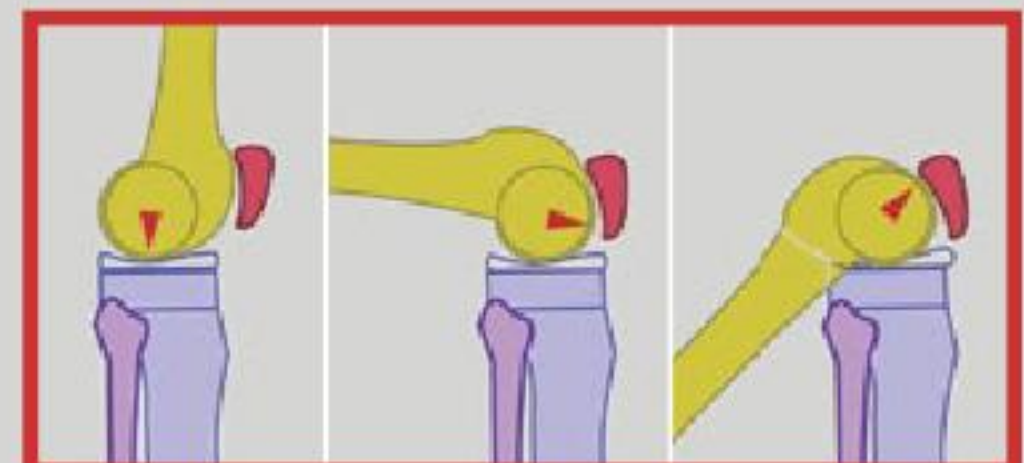
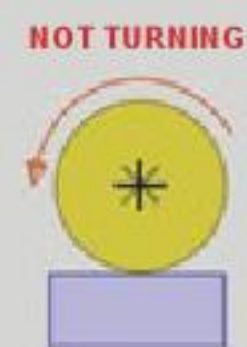
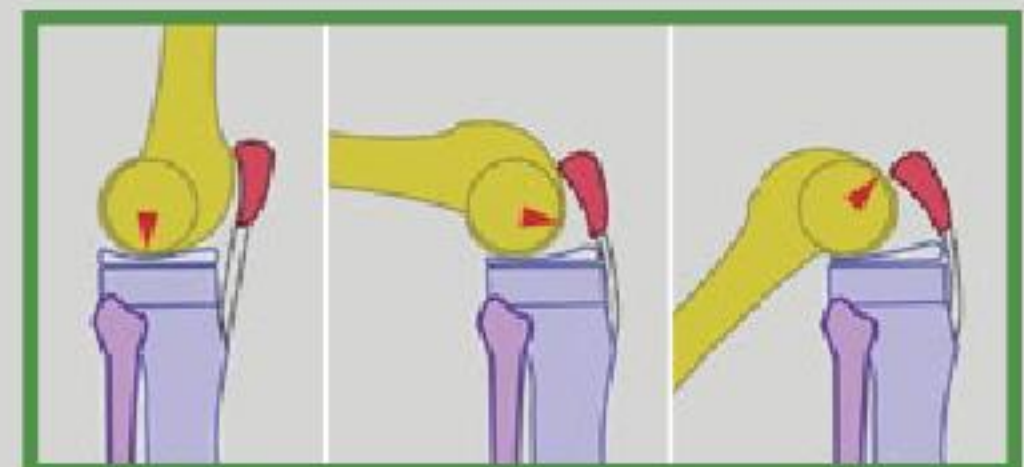
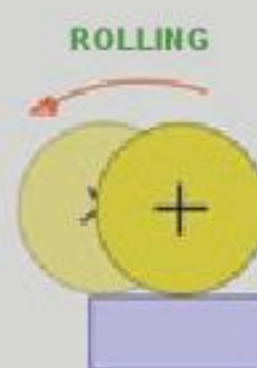
8 VASTUS LATERALIS

9 QUADRICEPS TENDON

**PATELLAR LIGAMENT ⑤** DO NOT STRETCH LIKE TENDONS ⑨ SO THE DISTANCE BETWEEN KNEE CAP AND TIBIAL TUBEROSITY ④ REMAINS CONSISTENT.



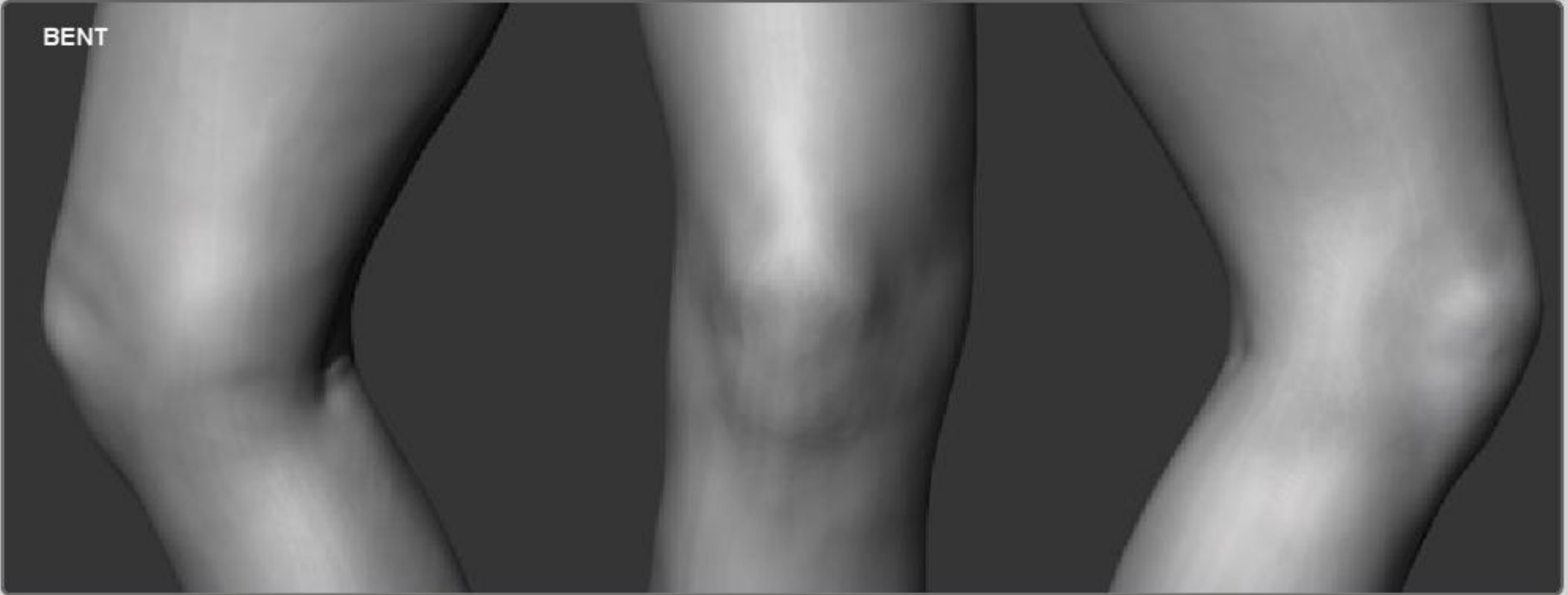
THE HEAD OF THE **FEMUR** IS **ROLLING** OVER THE TOP OF THE **TIBIA**, **NOT TURNING**.





## 3D SCAN OF RIGHT KNEE

BENT



VIEW



VIEW



VIEW



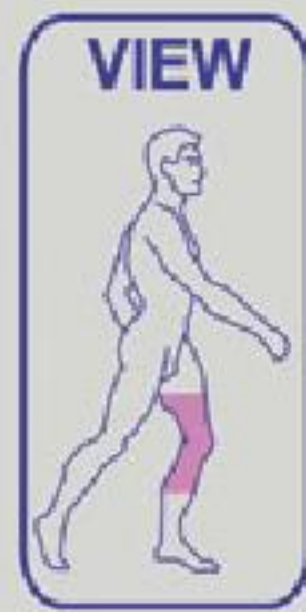
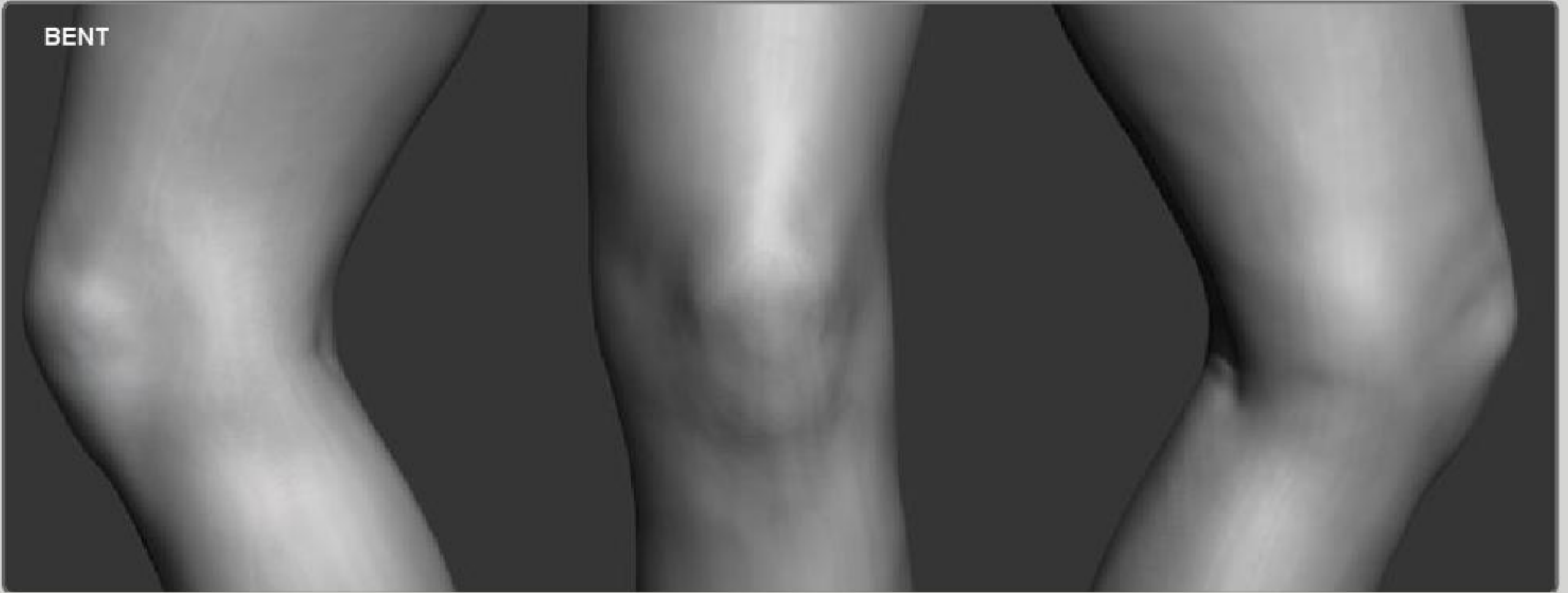
STRAIGHTENED





## 3D SCAN OF LEFT KNEE

BENT

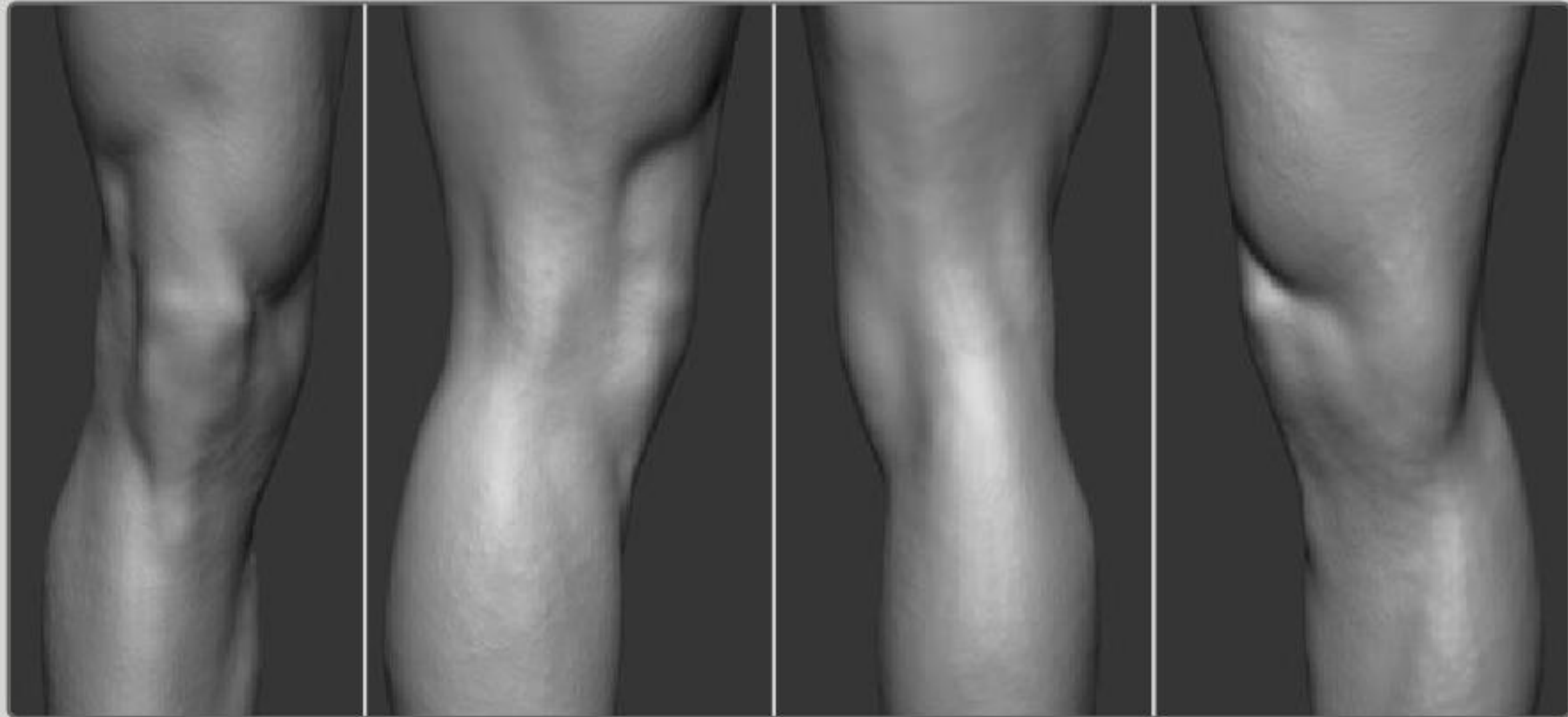


STRAIGHTENED





## 3D SCAN OF LEFT AND RIGHT KNEES



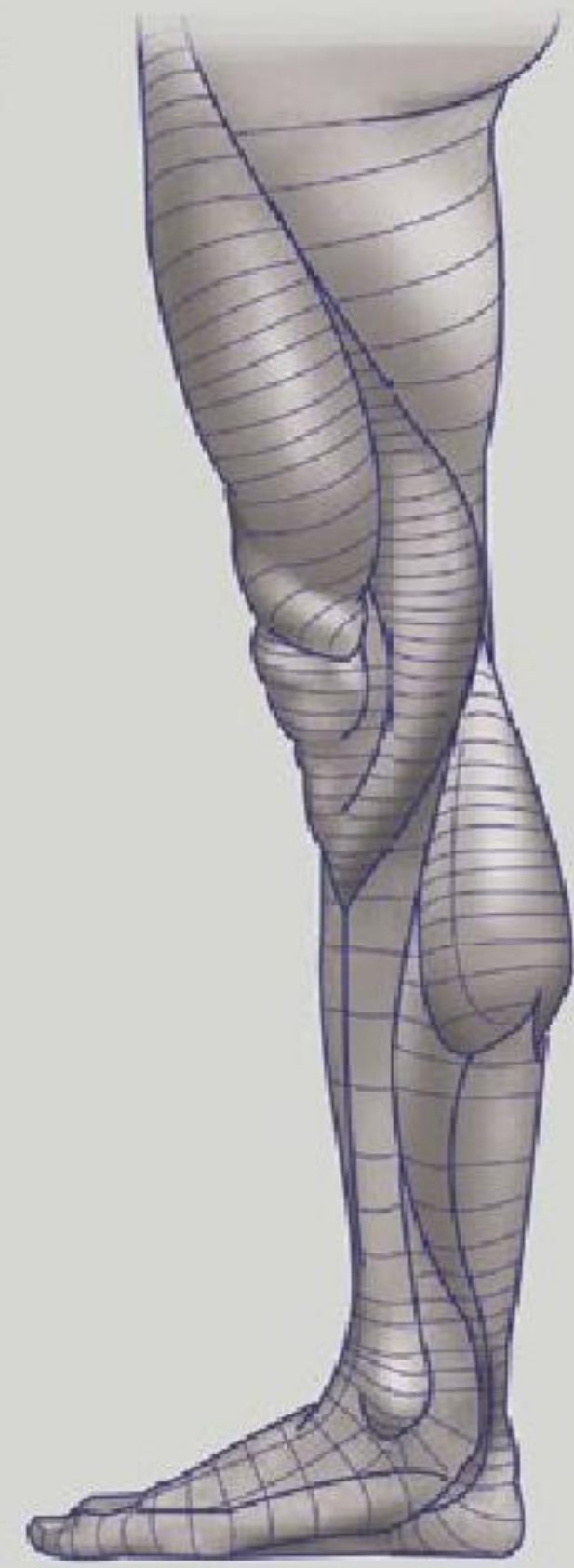
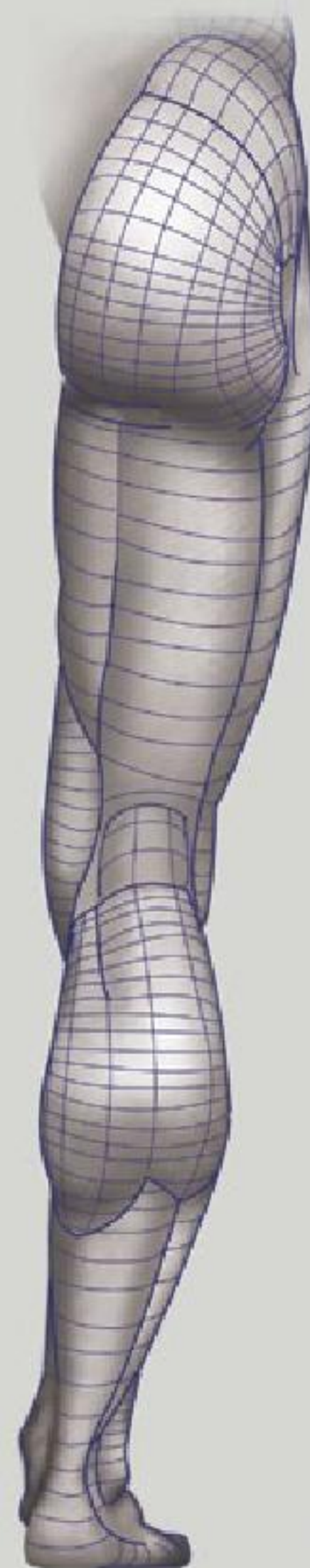
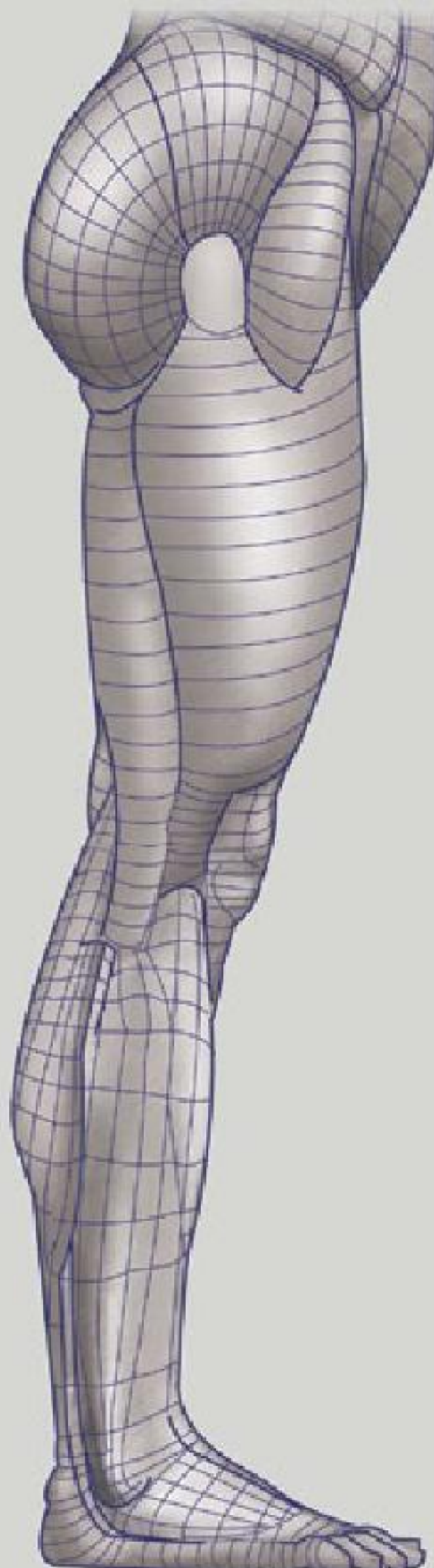
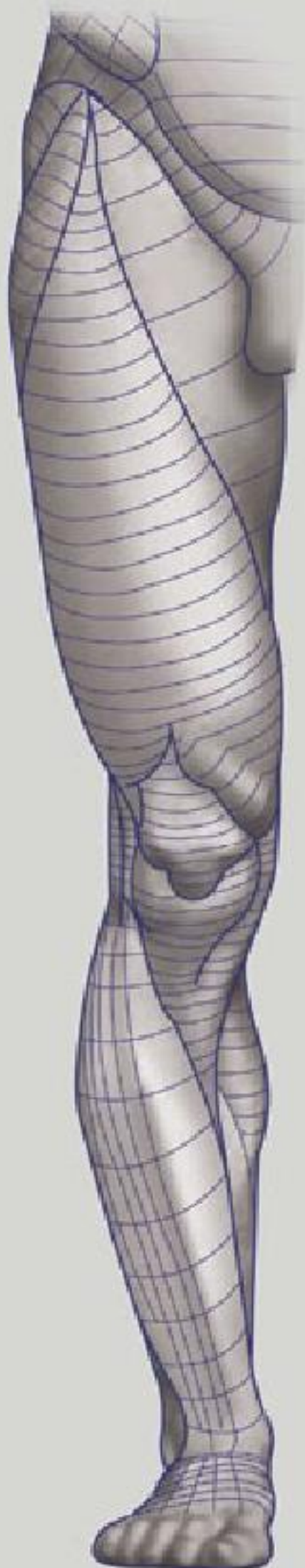


## FEMALE LEGS





## LEG SHAPES VIEWED FROM ALL SIDES



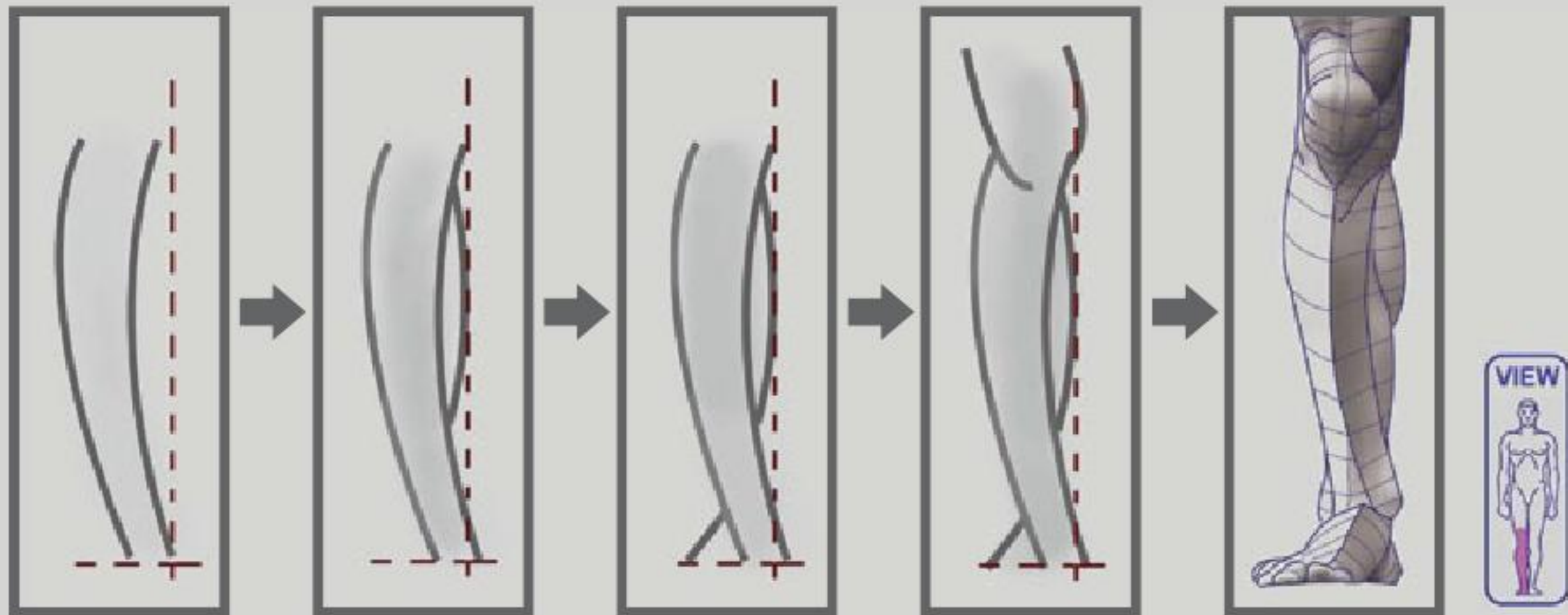
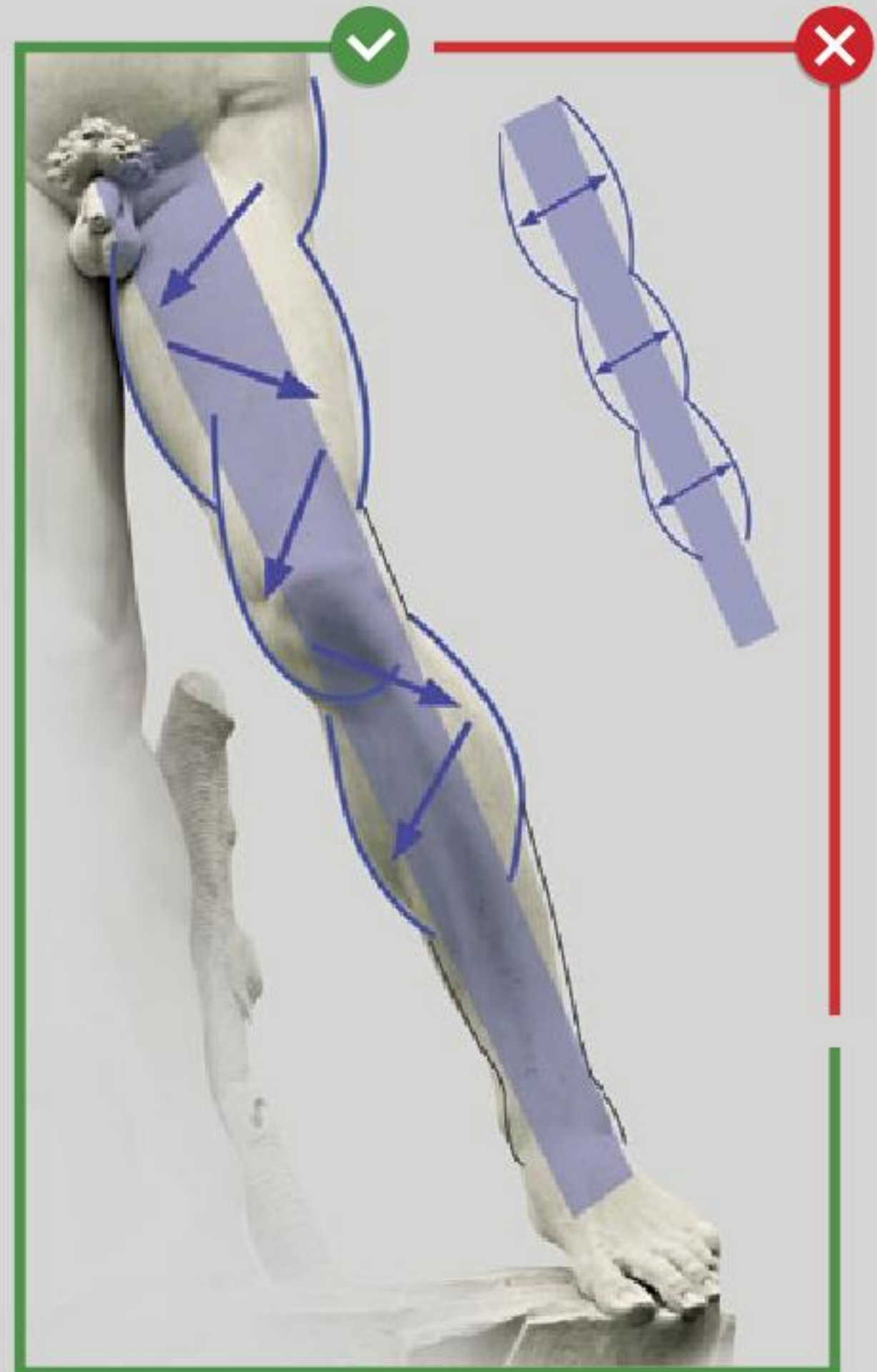


## 3D SCAN OF LOWER LIMB





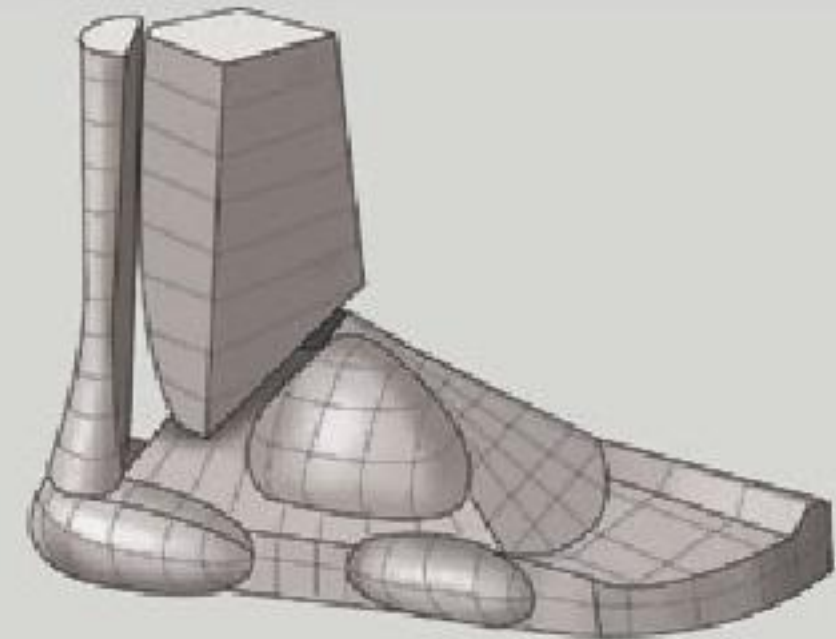
## MUSCLES TRAVERSING DOWN THE LOWER LIMB



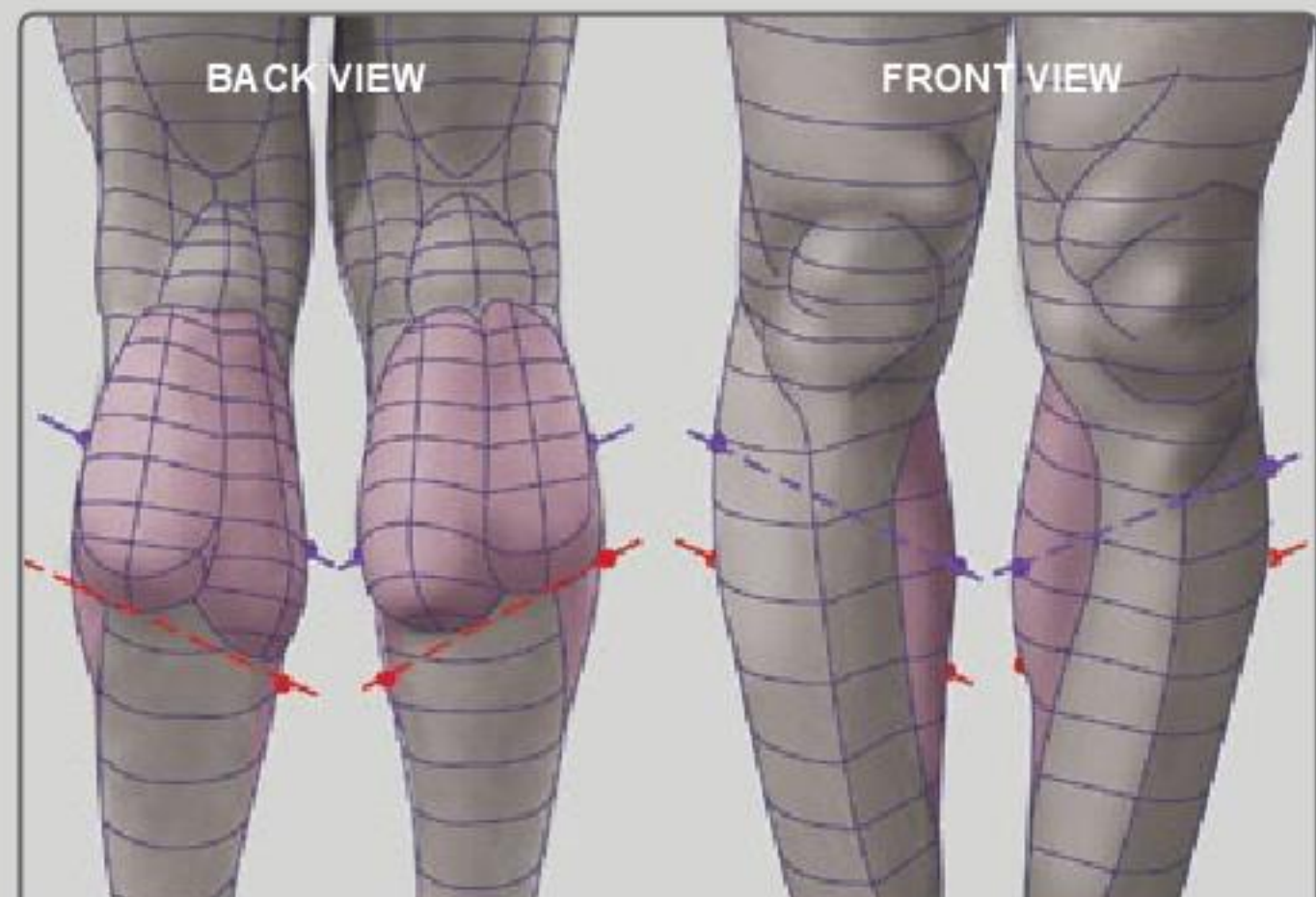


## ADDITIONAL SHAPES OF THE LEG AND FOOT

HEEL IS MOSTLY SHAPED BY **FAT PAD**.



THE INNER ANKLE CURVE IS HIGHER THAN THE OUTER ANKLE CURVE.



INNER PORTIONS OF THE CALF MUSCLES ARE LOCATED LOWER AND SHAPES ARE MORE ROUND AND MASSIVE THAN THE OUTER PORTION.



## FOOT MUSCLES



|                                |                              |                            |
|--------------------------------|------------------------------|----------------------------|
| 1 PERONEUS LONGUS              | 8 EXTENSOR HALLUCIS LONGUS   | 15 SOLEUS                  |
| 2 PERONEUS BREVIS              | 9 EXTENSOR HALLUCIS BREVIS   | 16 FAT PAD                 |
| 3 EXTENSOR DIGITORUM LONGUS    | 10 EXTENSOR DIGITORUM BREVIS | 17 TIBIALIS POSTERIOR      |
| 4 TIBIALIS ANTERIOR            | 11 PERONEUS TERTIUS          | 18 FLEXOR DIGITORUM LONGUS |
| 5 MEDIAL SURFACE OF TIBIA BONE | 12 ABDUCTOR DIGITI MINIMI    | 19 ABDUCTOR HALLUCIS       |
| 6 MEDIAL ANKLE (M. MALLEOLUS)  | 13 FLEXOR HALLUCIS LONGUS    | 20 ACHILLES TENDON         |
| 7 LATERAL ANKLE (L. MALLEOLUS) | 14 GASTROCNEMIUS             | 21 CALCANEUS BONE          |



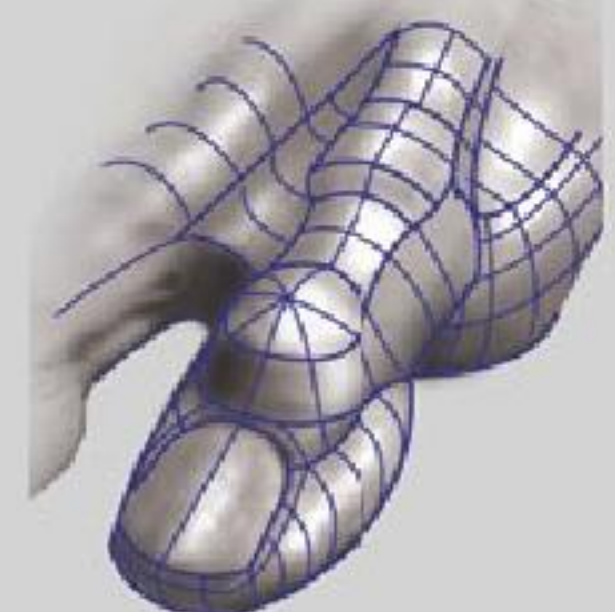
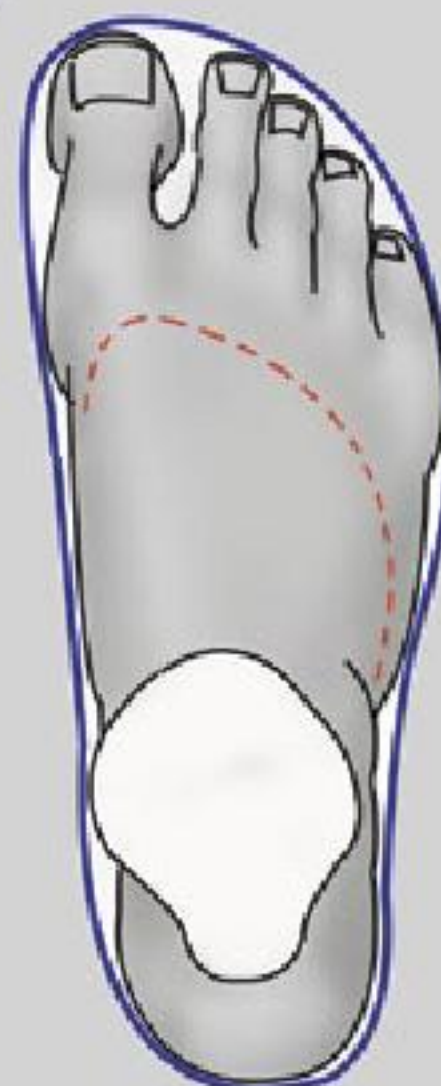
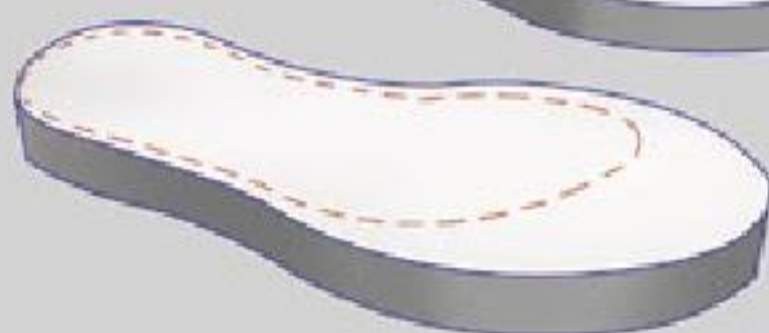
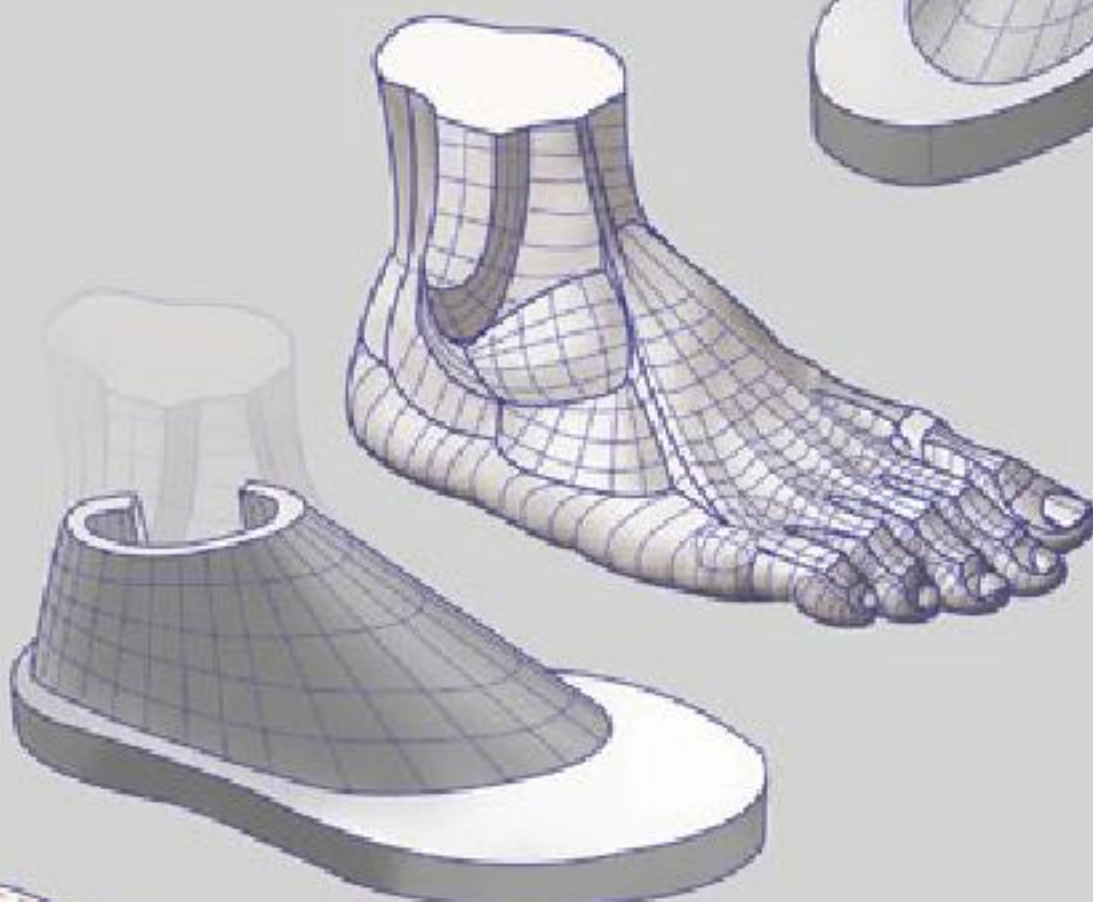
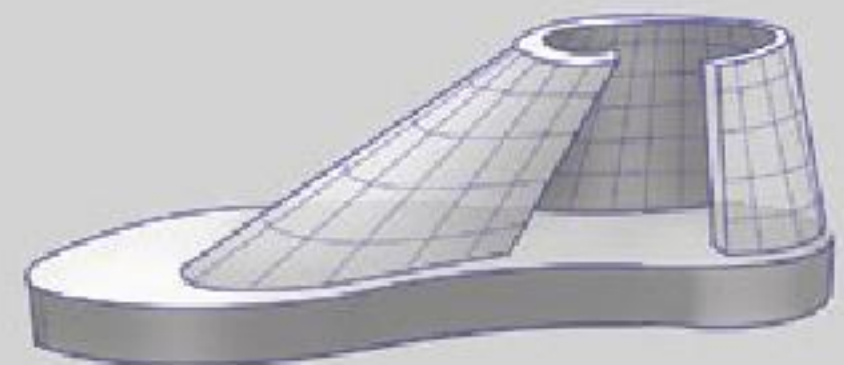
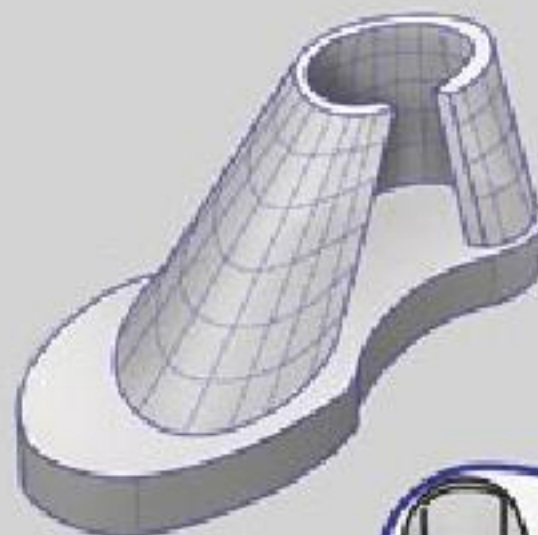
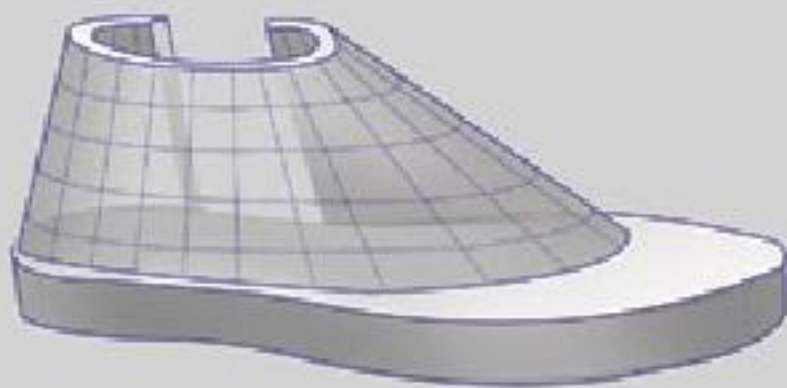
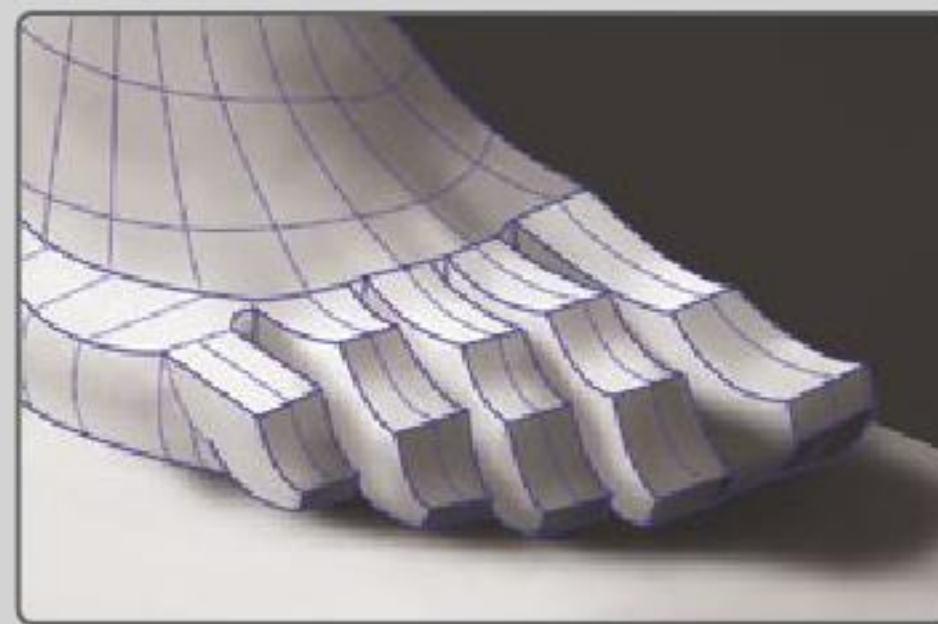
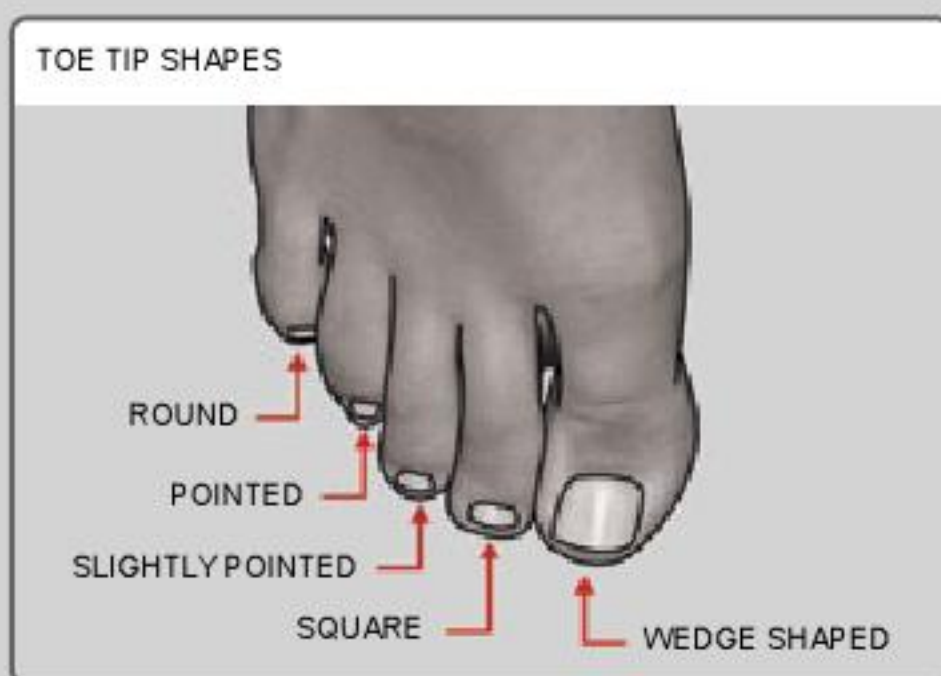
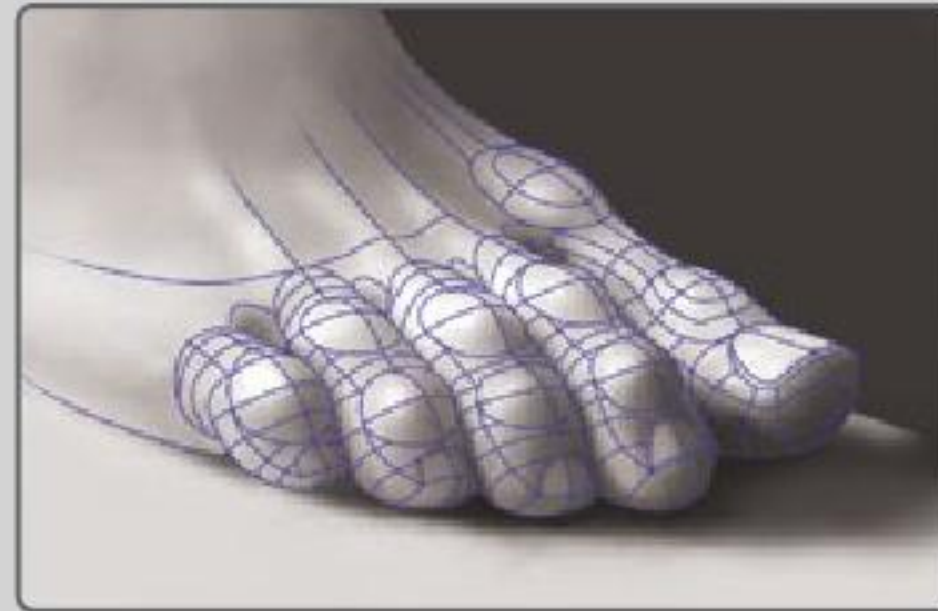
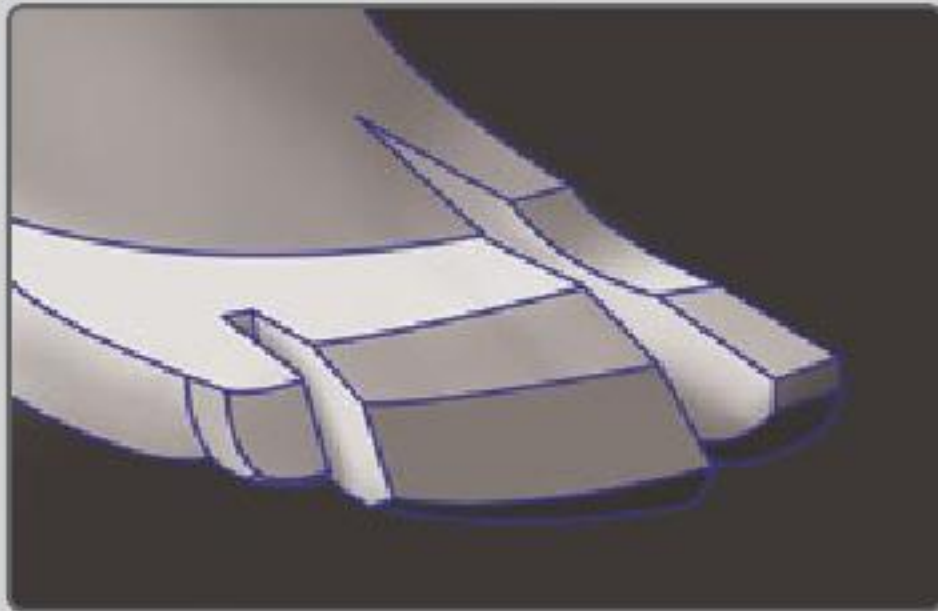
## FOOT SHAPES



RIGHT FOOT

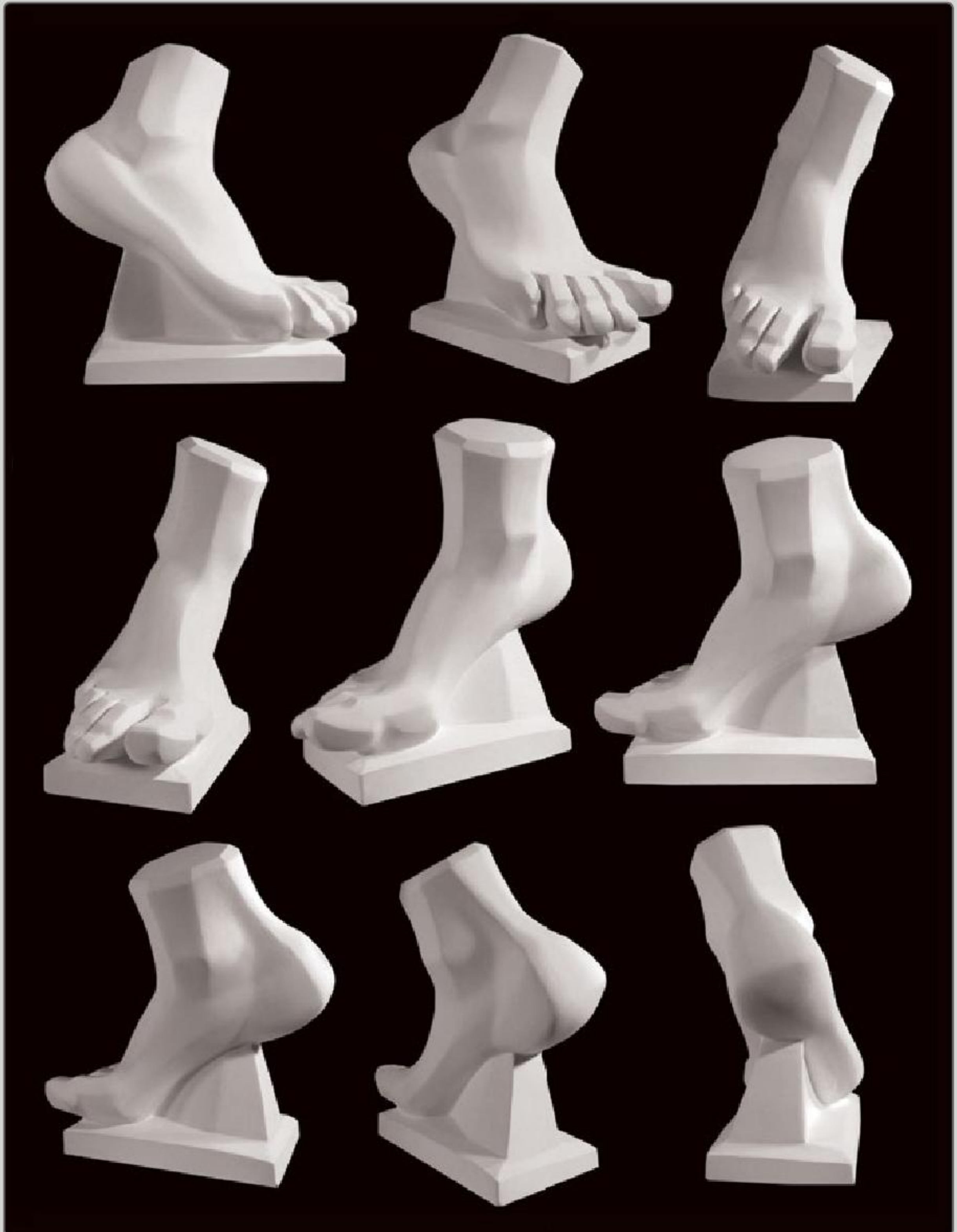


## FOOT SHAPES AND FORMING A FOOT



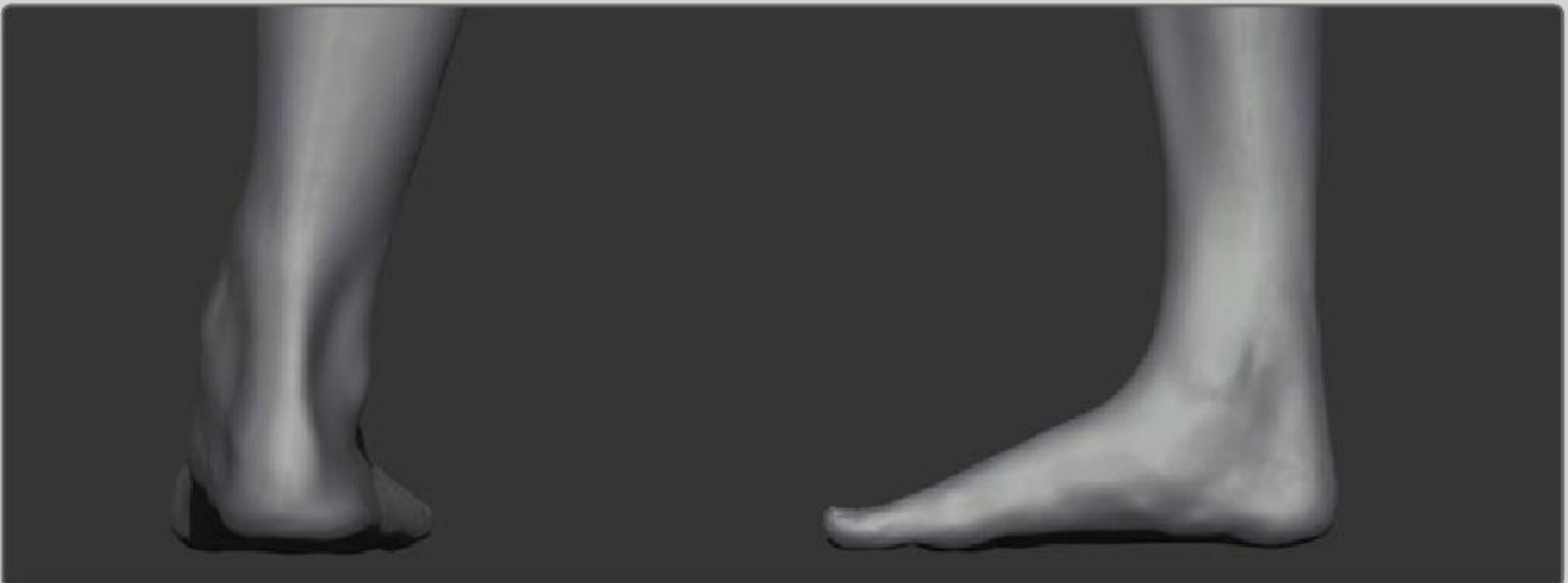
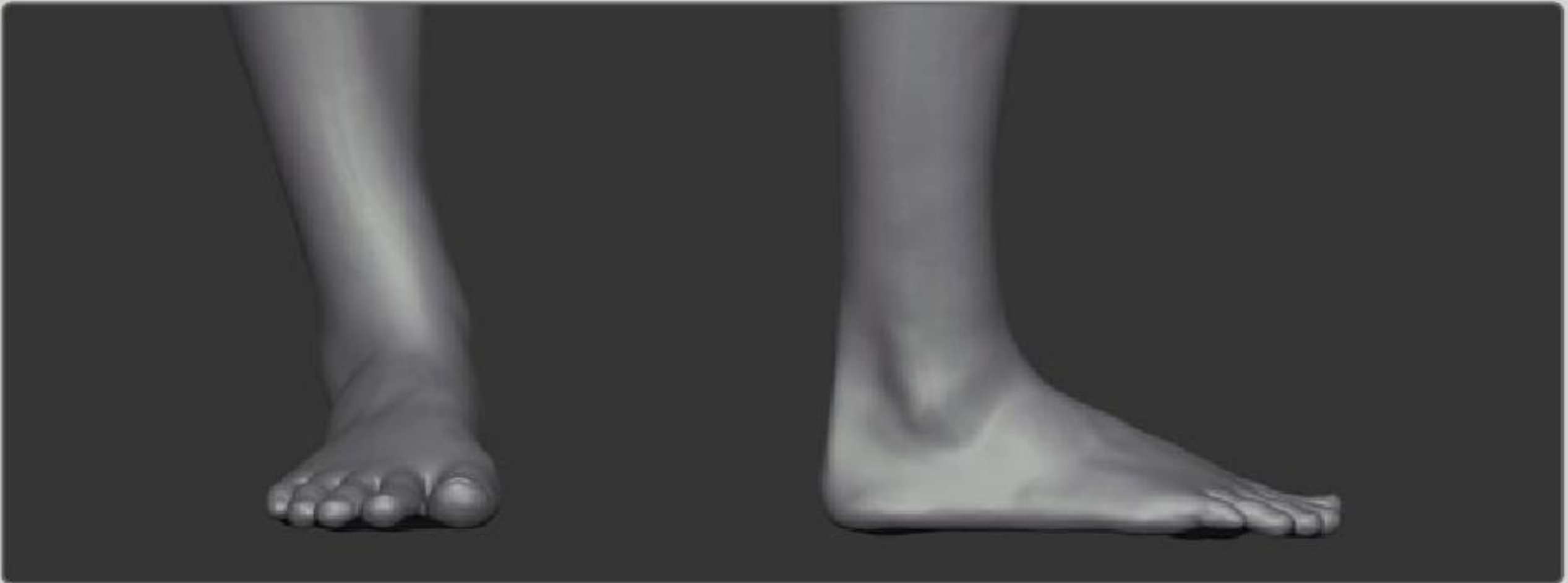


## BLOCKING OUT A FOOT



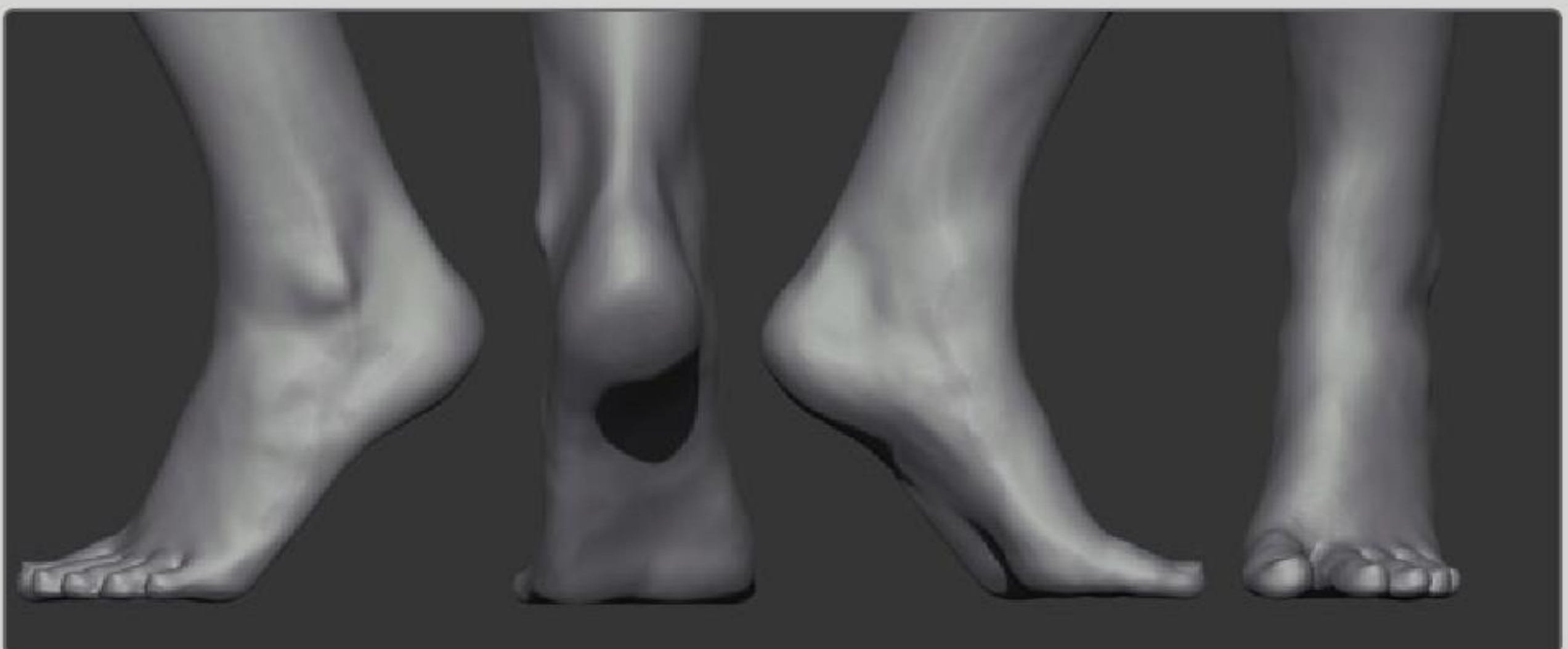
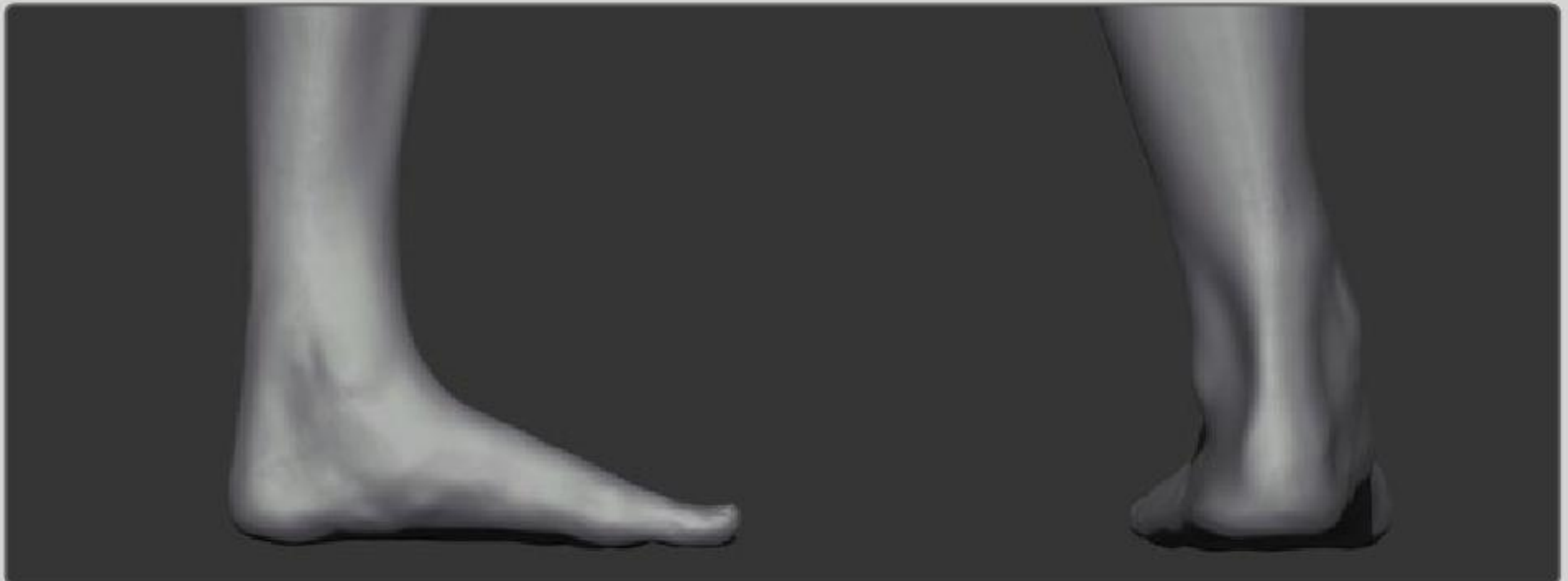


## 3D SCAN OF RIGHT FOOT





## 3D SCAN OF LEFT FOOT





## BABY FEET





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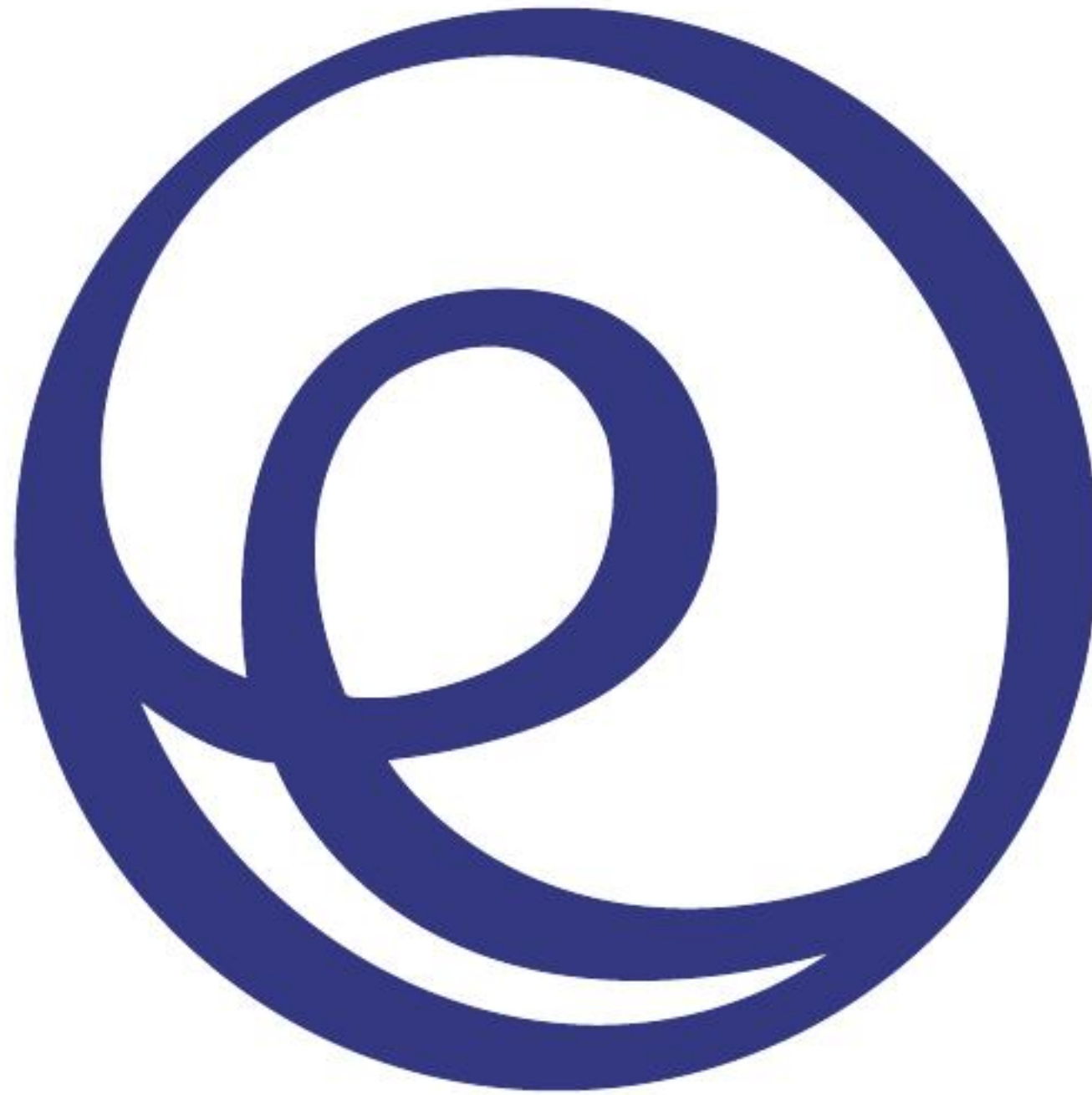
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